



FRIDAY, MARCH 10, 1893.

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Contributions.

The New York Railroad Club and Dead Woods.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I notice in the *Gazette's* report of the last meeting of the New York Railroad Club a brief discussion on dead woods and their use with M. C. B. couplers. Nothing appears to have been said about the couplers coming together with the knuckles closed, and nothing about the impossibility of coupling when a draft gear is weak or has been driven in or the draft spring has taken a permanent set. Without considering these points, a discussion of the subject is fruitless. One member said that without dead blocks the strain must be taken up by the coupler beneath the line of the sill, "which consequently broke off near the body bolster." The speaker forgot to include that most important feature of all recent M. C. B. couplers, viz., the buffer stop. As couplers do not extend back to the body bolster, there is no meaning to the statement that they break off near the body bolster.

One member said that some tail bolts he had observed broke under the head "where the iron was much crystallized, showing that the bolt was not hot enough when headed." If the speaker had had much experience with broken materials, he would have known that the sudden breakage undoubtedly caused the large crystals, as is almost always the case when the best fibrous iron is broken suddenly. Overheating, not underheating, is generally the cause of bolts breaking under the head. The same speaker said other bolts were "broken and crystallized in the keyway by drifting the hole out."

M. C. B.

Progress of Signaling in 1892.

The Union Switch & Signal Co.,
SWISSVALE, Pa., March 1, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I judge that that will interest you and your readers to know something about the progress of interlocking and block signaling, as illustrated by the business of the Union Switch & Signal Co. during the year of 1892. The comparison of the number of Saxby & Farmer levers applied during the last four years will give some idea of this progress, and will also show the enormous impetus given to the work during the year 1892.

	1889.	1890.	1891.	1892.
Saxby & Farmer levers.....	1,198	1,367	1,651	3,602

The 3,602 Saxby & Farmer working levers were contained in 267 different mechanical interlocking plants, which makes an average output of a distinct interlocking plant nearly every working day of the year. In connection with the mechanical machines 2,274 signal posts and 1,493 switch and lock movements were used, while during the year 6,490 detector bars were shipped, which last, if placed end to end, would cover a distance of something more than 55 miles.

In pneumatic interlocking the progress is equally satisfactory and encouraging. Nineteen different pneumatic interlocking plants were built, which, in connection with the Pneumatic Block Signaling, required the use of 420 signal posts and 289 switch and lock movements. It will be seen, assuming the trees to have grown 20 ft. apart, that we destroyed about 25 acres of pine forest in the construction of our signal posts.

In addition to the working levers 659 spare spaces were provided with the Saxby & Farmer machines, which therefore must have reached a total length of 1,775 ft., without taking into account the 167 Stevens levers and 14 spare spaces which were also supplied for manual block systems and yard interlocking plants. Three hundred and six Union Lock and Block instruments were also built and shipped, which shows that the manual lock and block system is still a very live subject; and last, but not least, we handled about 27,000 tons of material.

As we have made it a practice to render unto Caesar those things which are Caesar's, we cannot close this note without saying that to the continued efforts of the *Railroad Gazette* much of this progress is due.

THE UNION SWITCH & SIGNAL CO.,
GEO. H. PAINE, *General Agent.*

Horse Power of Manhattan Locomotives.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the *Railroad Gazette* of Feb. 24 a diagram was published showing the horse power of the Manhattan locomotives. I much admire the courage of one who has sufficient confidence to draw the lines given on that diagram. Some of these lines are of the sort we have been seeking for with much hard work. For instance, the author of the diagram has given the engine friction, wheel and axle friction and air resistance of trains on an elevated road where the track is practically smooth, the bearings comparatively free from grit, and the conditions non-comparable in these respects with surface roads. Now, the air resistance on an elevated with the wind deflected by buildings and the speed comparatively slow is not to be determined by comparison with tests made on surface roads; but this is perhaps a minor matter.

The most curious part of the diagram is the uniform increase of indicated horse power from zero to 15 miles an hour, the mean effective pressure being assumed as a constant of 100 pounds per square inch for all speeds up to 15 miles an hour, which, of course, makes the total horse power in proportion to the number of revolutions; these being in turn in proportion to the speed gives as a result the horse power directly in proportion to the speed.

It is perhaps needless to say that this diagram means nothing and is of no practical value, as it is not based on reliable data. If the author will get indicator cards from the Manhattan engines at speeds up to 15 miles an hour, and calculate the horse power, he will obtain quite different results from those given in the diagram. The mean effective pressure decreases rapidly after the engine starts. Curiously, proof of this was given in the *Railroad Gazette* of Feb. 7, 1890.

ELEVATED RAILROADER.

Manhattan Railway Company,
NEW YORK, March 7, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

"Elevated Railroader" is in error in assuming that the author of the diagram in question has not taken indicator cards from the Manhattan engines. He has, and is well aware that in general terms the mean effective pressure falls as the speed increases. The diagram was prepared to show the maximum capacity of the engines on the steepest part of the Sixth avenue line, from the junction of Fifty-third street with the Ninth avenue line to Fifty-ninth street. It is impossible for engines to approach this two per cent. grade with much headway, because of the sharp curve at the junction (90 ft. radius), and also because they are frequently compelled to stop on the hill because of trains ahead at Fifty-ninth street station. In such cases the reverse lever is left "down in the corner," and steam is worked at nearly full stroke until the throttle is closed to make the stop. We find that up to 15 miles an hour the I. H. P. will increase with the same point of cut-off in direct proportion to the number of revolutions per minute.

Your critic takes exception to the small amount of power charged to wheel and axle friction. The writer has seen the pull per ton as low as 3½ lbs. with a tested dynamometer on Manhattan coaches. He also speaks of the effect of wind being lessened by building. This applies to side winds which sweep through cross streets. It was stated in the article in question that a head wind of 10 miles per hour was assumed. If "Elevated Rail-roader" will go to the point in question he will see that a head wind sweeps straight down Ninth avenue, without obstruction, as far as the eye can see, except by the occasional elevated stations.

L. M.

L. M.

Neatness and Economy at Small Stations.

SPRINGFIELD, Ill., March 3, 1893.

TO THE EDITOR OF THE RAILROAD GAZETTE:

One matter which contributes greatly to the comfort and convenience of the patrons of a railroad is the proper ordering and care of station buildings. A passenger depot may be really too small and in many respects inconvenient for the traffic that comes to it, but if it be neatly kept the disadvantages will be overlooked to a great extent. Proper care of stations also extends to some items which, while not affecting the personal comfort of the passenger, have a marked effect in the impression given of "thoroughness and care." I refer particularly to the matter of neatness outside the buildings proper. How often we see a station

whose most noticeable characteristic is an unkempt appearance! Pieces of old papers are lodged in fence corners, and all sorts of rubbish here and there; not enough to warrant the employment of a special gang of section men, and yet too much for the peace of mind of any one who loves neatness. Why are not station agents made to attend to a matter so simple?

It is not necessary that at ordinary stations the expense should be incurred of grass plats, shrubbery and flower beds, but the buildings should be kept in repair outside and kept well painted; the platforms should be well kept up. It is better to have 50 ft. platforms with a carpenter gang large enough to keep them in thorough repair, than to have them 100 or 150 ft. long and feel all the time that the expense of repairs is too heavy. A good cinder walk (two or three inches higher than the rail) is better than a shaky plank platform. Cinders are suitable for the farther ends, where not much wear comes, at many stations where they cannot be used for the whole platform.

The ground on *all sides* of the station building should be kept smoothly leveled and graded in such shape that there will be no depressions for the collection of water in pools. Cinders when smoothly raked make a very neat finish for any part of the station grounds, and such a surface drains quickly. Most division superintendents ought to pay much more attention to what seems to them the back side of small stations, but which, to the townspeople, is the front side. The station agent, as well as the superintendent, is liable to look upon the town side as the back side, and he should be admonished (gently or otherwise) whenever he is inclined to treat it as though it were like the colored philosopher's back door—"mostly all swill bar'l."

At all large stations there should be at least a small grass plat or park. It is very grateful to the eye, and need not be expensive to keep up. The passengers deserve an oasis every 50 or 100 miles, at all events, however poverty-stricken the superintendent may feel when he looks only at the small country stations.

One doesn't need to inspect a large number of stations before he finds that in the inside of the station buildings there is also much to be desired. Floors are left in poor repair and badly cleaned. Some men use plenty of water, but manifest no skill in putting it where it will do the most good. The walls are not swept of cobwebs and dust, and show a decided lack of paint and white-wash. The station stove is not usually an attractive object. It often stands in a large pan which is used as a spittoon by the numerous tobacco users, and seems never to have been blackened. The pipe is apt to be put up askew, badly fitted, and has become rusted through in places. It should be noted, by the way, that under such conditions it becomes a fertile source of danger. The elbows, if made of the ordinary rectangular pattern, are the first parts to go. There is economy in using a curved elbow, of heavier material than the balance of the pipe, as the most wear comes at this point, where comes the change in direction of the products of combustion.

The telegraph and ticket rooms should be neatly kept, and all papers and blanks in place, and no accumulation allowed. These features should be an index of the regimen throughout the premises. The agent who keeps his office in neat condition is one who can be expected to see that the same standard is enforced outdoors.

Where the freight house is in the same building with the passenger room, it is especially necessary that the freight room should be kept swept, and the goods neatly arranged and piled. No accumulation of old material or unclaimed freight should be allowed. This is important in any freight house, but more so here. A suitable place, as for instance under one end of the platform, should be set apart for the collection of any scrap metals picked up around the station. The supply of fuel should be housed, both on account of saving of time in handling in snowy weather, and to avoid loss from theft or slacking in case of soft coal.

One fertile source of loss around a station is the lamp room. Though only at the larger stations is there needed a lamp room, pure and simple, yet at even the smallest there are enough station and switch lamps and lanterns to warrant the establishment of a special place for their care and replenishment. A cupboard with a tray on top, both being zinc lined, makes a cheap, safe and convenient arrangement for doing the work on lamps and lanterns, for holding the same when not in use, and for storing the various oil cans.

Care should be taken that no waste is allowed to stand partly used and more or less saturated with oil, as such accumulations give ready food for the smallest spark. If there has been any dripping of oil from tanks and cans, it is well to keep the floor well sanded. Fire risk, like the risk of a collision from forgetting train orders or from depending on one poor watch for safety, is a risk which employes do not fully realize until they have had a lesson from experience—unless they be naturally very cautious. Carelessness in the use of waste and oil should therefore be duly reprimanded in every case, and severer measures adopted in season, when necessary, without compunction.

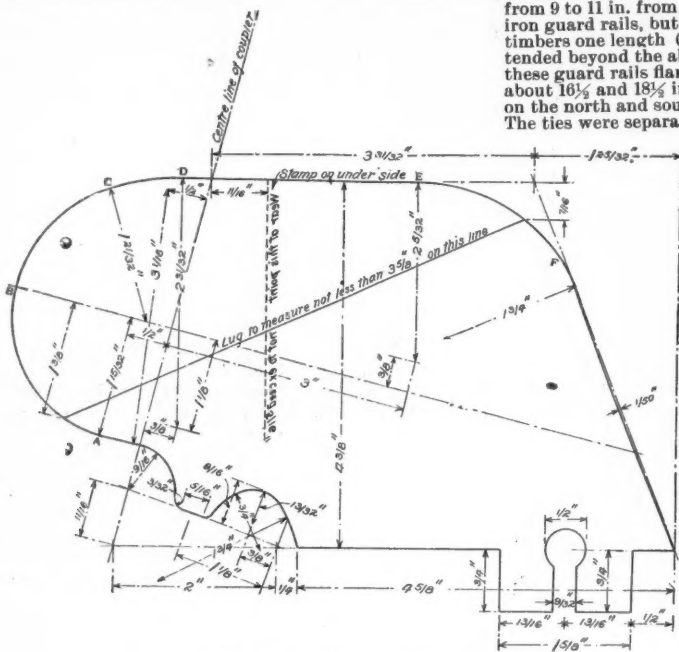
There is hardly any little thing that helps a station so much in appearance as the use of fresh paint on the train order signal, switch targets and such like small appliances quite frequently. This is especially within the province of the superintendent or other inspector, as he can keep track of the different stations and see

that they maintain something like a uniform standard, whereas the station agent has no standard but his own taste, which may be too low and lead him to put up with dirt too complacently, or too exacting and lead him to send for the paint pots oftener than is necessary.

G. C. H.

A Coupler Gauge.

Our readers will remember that we have taken much interest in the matter of the wear of vertical plane couplers, and long ago insisted that something should be done to determine what are the safe limits of wear, and that this question should be considered by the Master Car Builders' Association. No action of the kind having been taken by the Association, individuals have taken the



Baltimore & Ohio Coupler Gauge.

matter up, and a simple and efficient gauge for determining the limit of wear of M. C. B. couplers has been designed by Mr. Hazlehurst, Superintendent of Motive Power, and Mr. F. J. Cole, Mechanical Engineer of the Baltimore & Ohio, and put in use on that system. It is illustrated in the engravings which appear with this, the gauge being shown by heavy lines on the diagrams in several positions. In fig. 1 it will be seen as used to show the wear of the coupling face of the knuckle and drawhead. In this test the knuckle is pulled out tight against the lock, and, if the gauge passes through, the coupler is to be repaired. The wear of the top lug of the drawhead is also ascertained when the gauge is used in this position. It will be seen that a line appears on the face of the gauge, and the measurement of the lug is made on the prolongation, A B, of that line.

In fig. 2 the gauge is applied to measure the wear of the guard arm. With the gauge in this position the wear of the guard arm is measured by a rule placed on the scribed line, and the distance from the gauge to the face of the guard arm is taken.

In fig. 3 the gauge appears as used to measure the wear of the knuckle and of the pivot pin hole. The knuckle is to be replaced when it is worn on its coupling face to such an extent that the slot in the gauge can be passed over it, as shown in the engraving. The drawhead is to be replaced when the pivot pin hole is worn, so that the gauge will enter it, as shown in the same engraving. The limit of wear of the locking pin is also indicated in the engravings. It is replaced when worn $\frac{3}{8}$ of an inch deep at A.

This gauge should not be confounded with gauges for measuring the accuracy of construction of new couplers. It is not intended to supersede, and does not conflict with, the gauges of the Master Car Builders' Association, they being intended only for new couplers, while this gauge is intended only for old and worn couplers. Such a gauge as this must sooner or later be in the hands of every car inspector in the United States, as it is impossible to tell by observation without measurement whether a worn coupler is safe to run.

A Bridge Accident in Massachusetts.

In the last annual report of the Massachusetts Railroad Commissioners appears a special report from Prof. George E. Swain on the accident which occurred on the Fitchburg Railroad, near Ayer Junction, Feb. 11, 1892. Although it was a good while ago, Professor Swain's report is interesting enough to stand reprinting even now.

The train which was involved was a freight with 26 heavily loaded cars besides the caboose. It was running down grade, largely without steam, and perhaps from 20 to 25 miles an hour. As the train approached the bridge the brakemen began to put on the hand brakes. Before the engine had passed off the bridge the engine-man discovered that something had happened, stopped as soon as he could, and found that all but the first four

cars, which were still attached to the engine, had been wrecked and most of them had gone into the river. The train was eastbound, and the bridge under the eastbound track was a total wreck and was in the river. The bridge was a deck plate girder of two spans. There were two girders under each track in each span; that is, eight girders in all, and the spans were discontinuous. The whole structure is said to have been unquestionably safe.

The floor consisted of hard pine ties 8 x 8 in. in cross-section, and 11 ft. long, and these ties were notched over the flanges of the girders, the depth of the notch varying according to the number of plates in the flange. There was no connection between the ties and girders except that the ties were held in place by the notches. The ties were 6 in. apart in the clear, and were held in position by guard timbers of hard pine 5 x 8 in., two for each track, notched 1 in. over ties, and bolted to every fifth or sixth tie by a $\frac{1}{2}$ -in. bolt. These guard timbers were outside of the track rails, their inside edges being from 9 to 11 in. from the rail head. There were no inside iron guard rails, but from the ends of the outside guard timbers one length (about 25 ft.) of flaring rail was extended beyond the abutments. On the eastbound track, these guard rails flared so that at their ends they were about 16 $\frac{1}{2}$ and 18 $\frac{1}{2}$ in. from the track rails, in the clear, on the north and south sides of the track respectively. The ties were separate on the two tracks, that is, they did not extend continuously under both tracks or over all four girders; on the contrary, since the tracks are 12 ft. apart from centre to centre, and the ties were 11 ft. long, there was an open space 1 ft. wide, from end to end of the bridge, between the ties on one track and those on the other track.

After the accident, only one of the four separate spans composing the bridge was found uninjured, namely, the west span under the west-bound track. The east span under the east-bound track was completely removed from its supports, and was in the river; moreover, the two girders composing this span were completely separated, the lateral and cross bracing connecting them having been entirely cut through in such a way as to indicate that something had got in between these two girders, bending them all in the same direction. The west span under the east-bound track was still resting on the abutment at its

that the wheel was in when it reached the bridge, and how much it was broken during the accident, cannot of course be stated. The tread of the wheel shows near the brake a flat spot where it has been slid. The fractures show generally good material and a good chill, but at one point the break was through the flat spot, and the fracture shows a different appearance, probably the result of the sliding.

So far as the wheel is concerned, the question arises whether it was properly inspected by the Fitchburg Railroad Company, and whether it contained flaws which should have been discovered. It seems probable that the wheel did contain a flaw or crack at the time it was last inspected, but the extent of this defect, and the question whether or not it was sufficiently extensive or obvious to have been detected, even by a careful inspection, must remain matters of conjecture. When a wheel is as badly broken as this one, and when it has passed through such an ordeal and has lain in a wreck for some hours, besides being covered with dirt and oil, it is clearly impossible to ascertain what the precise condition of that wheel was some hours before the accident.

Unless overlooked this car must have been inspected early on the morning of the accident. It is not a difficult matter to overlook a small crack in a wheel, especially when the wheel is covered with grease and oil, and in the early morning in winter; and I am not prepared to make any statement which would attach any blame to the company in the matter of inspection. Topping the wheel with a hammer will not, as sometimes supposed, infallibly indicate a defective wheel. The matter of inspecting wheels was referred to at some length by your Board in its report upon the accident at Bradford on the Boston & Maine Railroad. Mr. Theodore N. Ely, General Superintendent of Motive Power of the Pennsylvania Railroad Company, wrote the following with regard to this matter:

"Inspectors very generally tap wheels with a hammer when looking over the cars, but we do not regard this as of much value, as it really determines nothing."

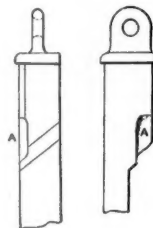
"Cracked wheels cannot well be discovered in this way, and unless the crack is long enough to be seen, a wheel with cracked brackets or treads, or small cracks between the plates, will generally give a clear sound when struck with a hammer."

"It would be a very difficult matter to find a lot of cast-iron wheels taken promiscuously which would give forth the same sound when struck with a hammer, varying as it will with the hardness and density of the metal."

"A wheel which gives a very sharp ringing sound would, generally speaking, be open to the suspicion of being too hard for safety."

"Nearly all the cracked wheels removed from cars in service are taken out while the wheels are comparatively warm, due to the action of the brakes, and, while in this condition, the cracks are easily located."

As long as railroads are run, wheels will occasionally crack while in service, and cracked wheels will, under



Replace when worn $\frac{1}{8}$ in. deep at A.

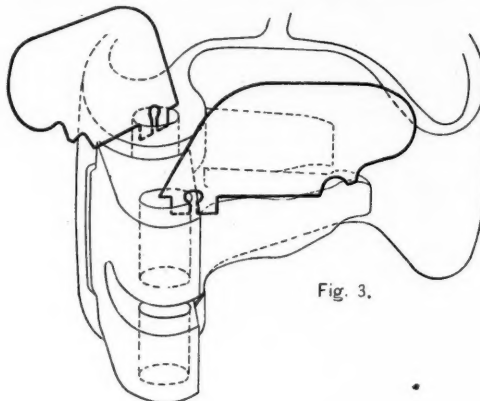


Fig. 3.

Coupler to be repaired, when gauge will pass through in this position.

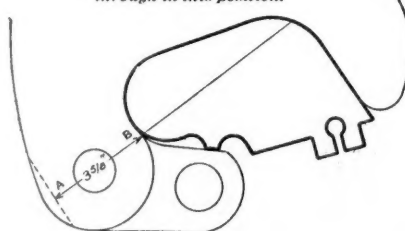


Fig. 1.

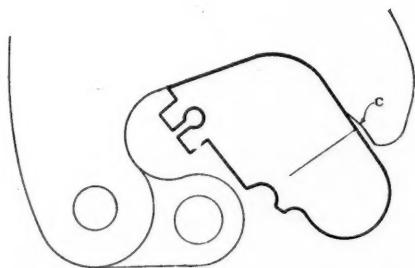


Fig. 2.

Wear at C not to exceed $\frac{1}{8}$ in.

Baltimore & Ohio Coupler Gauge.

west end, but its other end had been removed from the pier and was lying in the river; the girders were considerably bent, but the connections between them had not been broken except in a few places. The east span under the west-bound track was bent toward the north so much as to be entirely unsafe, and the south ends of the ties had been pushed up toward the east. The wreck on the other track had probably caused a car to strike this span, bending it out of shape; and a car had probably scraped along the ends of its ties. The other span, as stated, was uninjured. The cars in the river were all in the east span, under and to the south of the east-bound track.

The Cause of the Accident.—The primary cause of the accident was a broken wheel, and the consequent derailment of one of the cars. The wheel was found after the accident, and is preserved at the office of the company. It is a cast-iron wheel and is very badly broken, the whole tread being gone for a distance of about 32 in. along the circumference, and the flange being broken off for over half the circumference. The wheel broke apparently some time before the car reached the bridge. Two fragments of it, which fit exactly into the break, but do not fill it entirely, were picked up, one of them west of Shirley or about three miles back from the scene of the accident. The condition

unfavorable circumstances, continue to occasionally escape even the most careful inspection.

An examination of the track west of the scene of the accident shows some indications that a car was off the track, but, as the ground was frozen and covered with snow, the marks are not as plain as they otherwise would be. On a small culvert, about 1,000 ft. back, there are clear marks on the ties, and at other places between this point and the bridge there are similar marks, but they only show for short distances. At some places the marks are 20 or 21 in. from the rail.

The Bridge Wreck.—The strength of the bridge having been such that it could not break down under the train from inherent weakness, it follows that the train must have carried the bridge down, owing to the derailment. . . . The floor should be so constructed that a derailed truck will not break through it, will not be twisted and will not be allowed to get far enough from the track to strike the trusses of a through bridge or to fall off the ties. This bridge did not safely carry a derailed train, and to that extent it failed to fulfill the requirements which are aimed at, and which engineers believe can be fulfilled in many if not in most cases.

Just how this bridge was carried down will never be known. It seemed to me, at first, that the derailed car

might have got in between the two tracks, in the space a foot wide between the ties, and that in this way it might have forced the girders under the east-bound track toward the south, at the same time bending out the girders and bunching the ties under the other track. This theory, however, will not account for the condition in which the bridge was found, or explain the facts that the bracing between the two girders under the east span of the east-bound track was broken, and that the connections, as well as the web stiffeners, were all bent in the same direction. The only reasonable explanation of the occurrence, it seems to me, is that the ties were broken through, letting the derailed truck in between the two girders of the span referred to, rupturing the lateral and cross bracing, and carrying away the girders. It is possible to imagine that the girders of the west span might have been in some way forced from the pier by the cars in front, although it is impossible to form any very definite conception of the precise way in which this took place.

It remains to consider the manner in which the train could have broken through the floor of the bridge. With regard to this, it is probable that if the flaring guard rails had caught and brought back the derailed wheels, they would have passed safely over the bridge. That they did not pass safely over the bridge implies, with a high degree of probability, that the guard rails did not do the duty that was expected of them; and this

which appear to follow from the accident, may be stated as definitely as the case will admit:

First, the primary cause of the accident was a derailed truck, which became derailed owing to a badly broken wheel, and which ran for some distance on the ties before it reached the bridge.

Second, the bridge was of good construction and of ample strength. It did not collapse through weakness, but fell owing to the train breaking through the floor and forcing the girders apart and from their supports.

Third, this accident adds another to the list of those due to broken wheels. . . . The accident shows once more the necessity for great care and thoroughness in the manufacture of wheels, in testing and examining them before they are put into service, and in inspecting them while in use. It should be stated that this wheel, having been made in the winter of 1888, had already been in use over three years, and if its daily mileage was up to the average for freight cars, its life had already been longer than that of most cast iron wheels.

Fourth, the floor of the bridge was of good construction and ample strength. It conformed to the recommendations of the Board in all points except that outside guard rails were used instead of the inside guard rails which the Board recommends. These outside guard rails were not properly constructed; they did not flare sufficiently to provide for a derailment of more than about 20 inches, and they failed to do what they were

the junction of this street with J street becomes the main entrance and exit to the structure, the tower, which is 132 ft. high, being set in the axis of this street. The most important of the projections of the building toward the town on the west is an imposing apsidal pavilion, 64 ft. wide and 134 ft. 3 in. long. This is occupied by the main waiting room, which is the principal feature of the building, both within and without. This room extends through two stories and has two entrances directly from the streets under the shelter which is carried around the semi-circular end. At the end of the hall toward the track are placed the ticket, telegraph, Pullman and other offices; the exit and entrance to the tracks from this hall are arranged on either side of these offices. Over these offices runs a gallery overlooking the hall and continuous with the main longitudinal gallery of the second story.

The baggage and express rooms of the roads lie to the north of this hall, while the passenger accommodations are extended southward from this main central feature.

In the second story the main longitudinal corridor extends from end to end and passes across the main hall



UNION PASSENGER STATION AT PORTLAND, OREGON.

Designed by VAN BRUNT & HOWE, Kansas City, Mo.

probability is strengthened by the fact that the marks on the ties indicate that at one point, at least, the derailed wheel was 20 in. from the track rail, while the guard rail on this side was not over 18 in. from the track rail. In other words, it seems possible, if not probable, that the derailed truck passed outside the flaring guard rail; in this position it could much more easily break through the floor than if one wheel were confined by the outside rail close to the track rail.

Before presenting summarily the conclusions at which I have arrived in studying this accident, I may say that it was a matter of great surprise to me and to every engineer with whom I have talked regarding it, that a plate-girder bridge could be completely wrecked in this way. The case differs from any other that has ever come under my observation. Probably 99 engineers out of 100 would have doubted, before it happened, that a deck plate-girder constructed as this one was could be entirely demolished by a derailed train. It is easy to see how such a train might run off the bridge, or break through the floor and bunch the ties; but that it could carry the bridge entirely from its supports and let a whole train into the river is certainly surprising. This report has abundantly indicated that much of what

expected to do. It seems probable, though not certain, that proper inside guard rails would have prevented this accident. I believe that the guard rails of the Fitchburg Railroad will not in all cases do their work, and that steps should be taken to change and improve them; and I urge the adoption of the inside guard rails recommended by the Board, supplemented by one length of outside guard rails extending beyond the point of the inside guard rails.

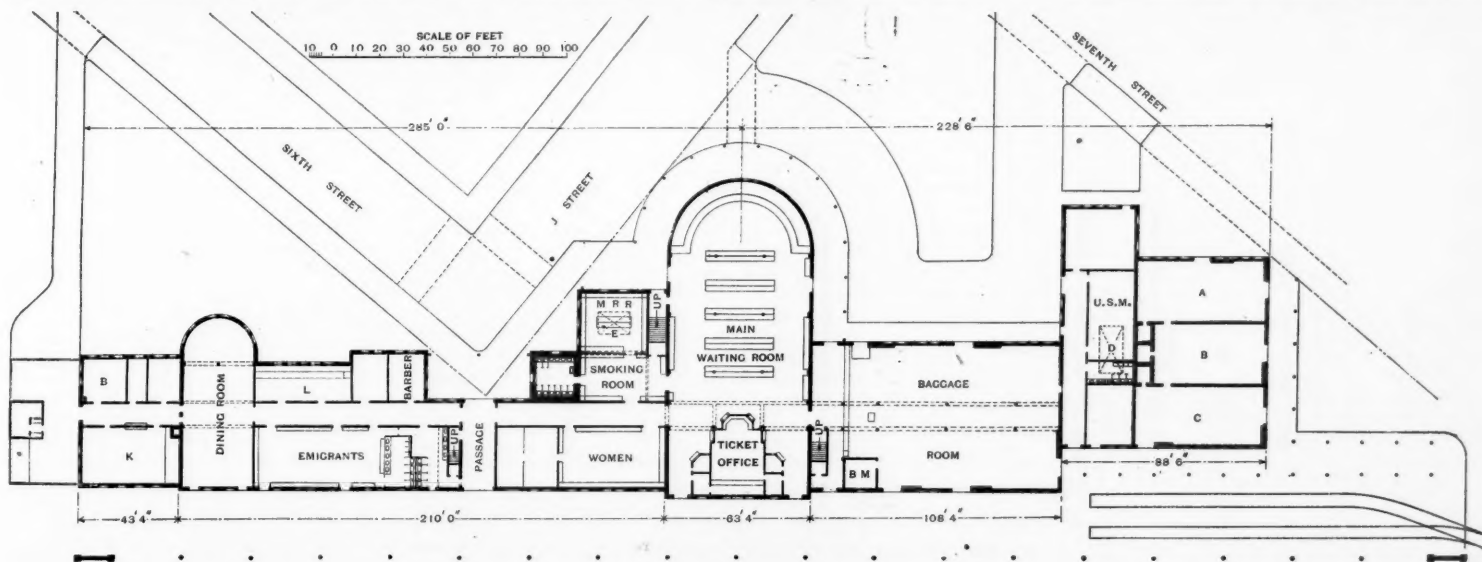
Union Passenger Station at Portland, Oregon.

We publish herewith an illustration, from the architects' drawing, of a handsome passenger station which is now in course of erection at Portland, Or. The perspective view includes an outlying building not shown in the drawing of the ground plan, but it does not show the trainshed. The ground plan is explained by the notes which appear under the drawing.

This building was designed by Van Brunt & Howe,

in a gallery, as above stated. To the right and left of this corridor are ample accommodations for offices which are subdivided for the convenience of the roads occupying them. The upper story is disposed of in a similar way, offices being extended in the third story over the main waiting hall. There are large staircases communicating both with the track side and the town side of the building.

The exterior walls are faced with the rough cast peculiar to Portland, set in panels between face brick quoins which accentuate all the external angles and windows of the building. This face brick treatment also is used in an external dado or stylobate 8 ft. high which is carried entirely around the building, and in string courses and cornice, as shown. The roofs are to be covered with metallic Spanish tiles, and the four dial faces in the tower are to be illuminated. The main corridors and halls of the first story are to be paved with marble mosaic, and the building will be fitted



UNION PASSENGER STATION AT PORTLAND, OREGON.

K, kitchen; L, lunch room; B, bakery; M R R, men's reading-room; E, D, skylights; B M, baggage master; A, B, C, express rooms.

really took place is involved in doubt, and that many points can only be surmised. One of the most inexplicable matters is the absence of marks on the ties back of the bridge. Generally the course of a derailed wheel can be traced continuously along the track on almost every tie. How a wheel as badly broken as this one apparently was, could have run along on the ties so far and leave so slight traces of itself is very remarkable, notwithstanding the frozen condition of the ground and the presence of snow. An accident like this is extremely rare, and without more definite knowledge as to what actually did take place than it has been possible to obtain, all conclusions must be largely hypothetical. It is a source of regret and of dissatisfaction not to be able to arrive at a closer knowledge of what occurred and why it occurred. The one person who might have been able to throw some light on the occurrence, namely, the conductor, who was at about the middle of the train, was killed. Nevertheless, the following conclusions,

of Kansas City, Mo., whose work may be seen in many important railroad buildings in the West. It is intended for the joint accommodation of the Northern Pacific, the Southern Pacific and the Union Pacific roads. The longitudinal axis of the building is parallel to the tracks, and the latter are diagonal to the direction of the city streets in that neighborhood. The adjustment of the building to the irregular outlines of the railroad property toward these streets has controlled the main features of the plan, the frontage of the station toward the tracks presenting a comparatively unbroken face, while that toward the town, shown in the perspective drawing, has boldly projecting features fitted to the available area. Sixth street being the natural approach to the building,

with all modern appliances useful in such structures. The main building and annex are constructed upon piles, upon which are built foundations of concrete.

Detached from the main building and 76 ft. south of it is an annex 135 x 37 ft. containing the boilers and all the machinery connected with the heating and the electric lighting of the building and grounds. This building also contains a laundry and additional accommodations for the restaurant.

The location of the pillars supporting one side of the train shed is shown at the bottom of the plan drawing. There will be six parallel tracks which are to be covered by a shed 102 ft. wide and 630 ft. long, resting upon steel and wooden trusses set 30 ft. apart, these divisions of 30 ft. constituting one element which

controls the main divisions of the plan of the main building. This train shed is not included in the present contracts. It is arranged to be set 30 ft. clear of the building and connected with it where necessary by glass roofs, so that all the traffic on the main platform will be properly protected from the weather.

The foundations are nearly completed and the work of erecting the building will be proceeded with as rapidly as possible.

Draft Rigging Chicago, Burlington & Quincy Box Cars.

In the accompanying illustration is shown the arrangement of draft rigging and end sills used by the Chicago, Burlington & Quincy Railroad for box and furniture cars, about which some inquiries were made at the meeting of the New York Railroad Club, held Feb. 16, 1893, and reported in the *Railroad Gazette* of Feb. 24, page 147. Referring to the illustration it will be seen that the ordinary drawbar timbers are dispensed with, and that the sills and car body are lowered so as to bring the sills on the line of draft of the drawbars. This allows the drawbars to be placed between the centre sills, thus carrying the pulling and buffing strains to the heaviest and strongest parts of the car.

One of the objections that has been raised to this arrangement is that notching out the end sill for the drawbar, as must be done, weakens the sill. It will be seen from the illustration that this objection has been met by strengthening the end sill with a beam, which is about as thick as the sill itself, and which extends across the two centre sills, so that the depth of the timber is even more than double that of the ordinary sill where

that repairs to the new designs of draft rigging are not greater than were those to the old is a strong point in favor of the new.

A more correct basis on which to compare the relative cost of repairs to the new and old designs of draft rigging, or in fact two of recent design, is the relation of this cost to the total cost of repairs to the cars other than to wheels and axles. It has been stated that repairs to the old form of draft rigging averaged 50 per cent. of the cost of repairs to the cars above the trucks; the C., B. & Q. find that repairs to the rigging illustrated amount to from 15 to 20 per cent. of these costs.

This saving in cost of repairs, together with the greater ease of loading and unloading cars with the lower floor that is possible with the drawbar placed between the centre sills, and the greater box capacity for furniture and other light freight that is obtained without any increase in the total height of car, are strong arguments in favor of this design of draft rigging.

The C., B. & Q. have had in use for about two years cars equipped with this arrangement of draft rigging, and so far everything goes to indicate that its general use would greatly decrease cost of repairs to car frames.

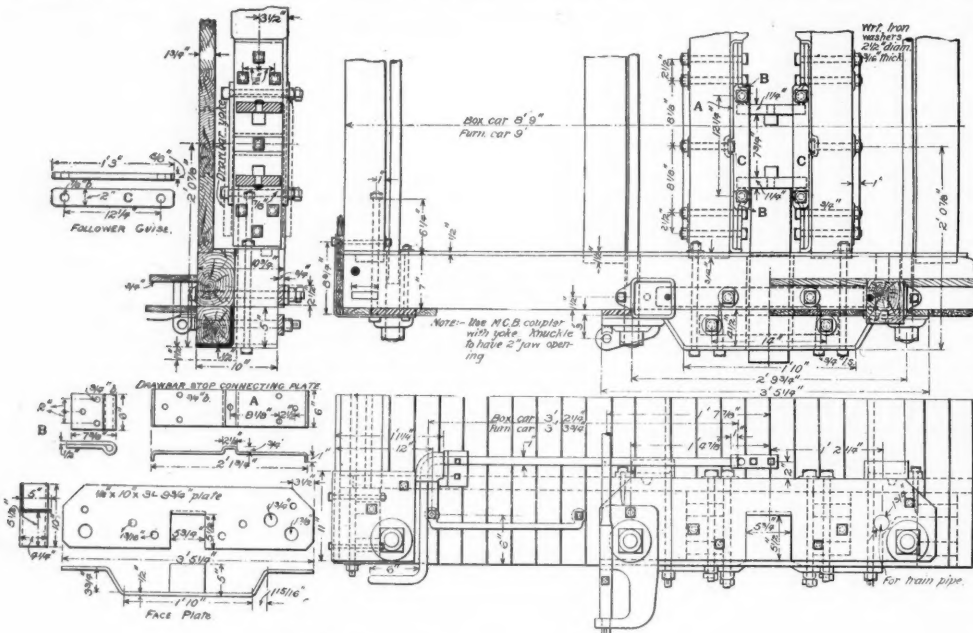
The Evolution of the Railroad Turntable.*

BY C. A. GREENLEAF, M. E.

Third Article.

While the former article described the turntables of the past, showing their weaknesses and defects, I propose in the present article to deal with the latest development in turntables, embodying all the modifications that experience has shown to be desirable.

Figs. 23 to 27 illustrate a turntable that is designed to



Draft Rigging, Chicago, Burlington & Quincy Box Cars.

the bracket of the drawbar comes in buffing. This provides more, rather than less, material to resist buffing.

The most interesting feature of this draft rigging, probably, is the manner of attaching to the centre sills. Referring to the plan drawing it will be seen that the draft gear consists essentially of two parts; a face plate "A," which protects the centre sill; and the two end stops "B" which are secured together by the face plate. Each plate has a projection which is recessed into the face of the sill. These plates are bolted to the centre sills with five $\frac{3}{4}$ -in. bolts, the two bolts at either end securing the drawbar stop. This is made by bending a plate 6 in. by $\frac{3}{4}$ in. double on itself, leaving an eye at one end through which the top and bottom binders are secured with 7-in. bolts. This arrangement serves to hold both stops together and distribute the buffing strains over all of the bolts and makes it act as one piece. All the parts are so simple that they can be made in the ordinary bulldozer or bending machine.

Another point decidedly in favor of this rigging is that 42 pieces commonly used are dispensed with in each draft attachment or 84 pieces per car.

The decreased number of actual breakages in service has decreased the delays to trains, and this is in itself a marked advantage. In comparing the cost of repairs of a new draft rigging with like costs of an old, the mistake is often made of simply comparing the records of total cost of such repairs for a certain number of cars, and if there is shown no decrease in cost with the new arrangement the conclusion is reached that the old design costs as little for repairs as the new. This is manifestly wrong, because the blows received from the heavy locomotives and cars of the present time are more severe than those received by the draft rigging a few years ago. In a paper read by Mr. D. L. Barnes before the Western Railway Club in January, 1892, this point is brought out very clearly (see *Railroad Gazette*, Jan. 29, 1892, page 81). It will probably not be denied that if the old style of draft rigging were in use now the cost of repairs would be greatly increased, and the simple fact

be so strong that it is beyond a possibility of breaking down, and is—1. Long enough to receive and balance the longest car or locomotive in use. 2. Can be easily turned by hand by one man in any kind of weather. 3. Snow and ice, freezing and thawing, do not disturb its adjustment or make it turn hard. 4. Cannot be capsized. 5. Locks and unlocks automatically, so that it cannot be injured by throwing the lock while the table is under full headway in turning. 6. With wearing bearings of hardened and ground steel, fully protected from dust or the danger of being disturbed or thrown out of position by the end thrust of the table in locomotive running too fast on or off of the table. 7. Revolves exactly true to the centre. 8. Perfect adjustment vertically, and 9, horizontally. 10. Tips and locks in line and surface automatically to receive the load, and unlocks when the locomotive is completely on the table, then balances with the load to a horizontal plane, maintaining that position until the engine is turned and moves to pass off the table; then tips again and locks in line and surface to allow the load to pass off the table, and when released from the weight adjusts itself always to a horizontal plane. 11. Platform rigid enough to swing the heaviest load clear at the outer ends of the table, and yet just flexible enough to receive the shock of the locomotive without being suddenly strained or broken. 12. Platform that has no diagonal deflection, but acts as one beam in receiving and discharging the load. 13. Not injured by corrosion. 14. Works as well after twenty years' severe service as when new. 15. The least possible depth of pit, 21 in. deep at outer end of table (one step) and drains at centre at less than 5 ft. The distance from top of centre-stone to base of rail in yard is 4 ft. 6 in.

If this table is placed on unyielding centre foundations, oiled twice a year, and not loaded above the load for which it is furnished, it is guaranteed to cost nothing for repairs for 10 years. It is the only centre-bearing turntable, and requires no outer end support while

*For earlier articles in the issues of Feb. 10, page 103, and March 3, page 161.

turning. It works as easily when it has a covered pit as when it has an open pit. The saving in cost of erection is the price of the circular track and the masonry required to support the circular track. At out stations, where there are few stalls, the masonry costs little, a centre pier, 17 cu. yds. and $\frac{4}{5}$ yds. for each track at outer support, being all that is required. Every part is made to a standard gauge and interchangeable in all parts with tables of the same length, while the centres interchange in all our tables. This table weighs about 45,000 lbs., and costs, f. o. b. Indianapolis at present, \$1,300, costing from \$500 to \$1,000 less to place in position than any circular track table of like length and capacity.

The "gun metal," of which the castings are made, is the same quality and tenacity as that used by Capt. Rodman in the United States Ordnance Department, of which he made the 15-in. Columbiads that the ordnance world prophesied would be a failure, but as to strength of material they were a grand success. This metal is very fluid when melted and almost always runs a solid section. It will be found in calculating strength of this whole table throughout that it has a factor of nine to one, the ultimate strength giving a capacity of about 1,200 tons breaking strain.

The girders are 66 ft. long, making a diameter of 66 ft. 6 in. Top flange straight, section at centre, where it couples to the forged steel tie bar is 51 sq. in. uncut section at "A." Section at "B" beyond the tie bar connection is 36 sq. in. uncut section, and gradually tapers to the end, which is 14 sq. in. section. The lower flange has 18 sq. in. section at centre, parabola in form, and gradually tapers to a section of 7 sq. in. The web is $1\frac{1}{2}$ in. thick, relieved from shrinkage strains by 28 circular holes through the web; the diameters shown in figures, 23 in. near the centre and $3\frac{1}{2}$ in. at outer end. The girders are severed at the centre and connected at the top flange with a forged steel tie bar, ultimate tensile strength of 60,000 lbs. per square inch. The size of the tie bar is 4 in. x 5 in. at centre, with double head, of 8 in. x 5 in., 8 in. long. The four shoulders of the tie bar are planed, and are each 5 in. x 2 in., giving a section equal to the centre of the tie bar, which is 20 sq. in. The lower flange is connected to each half girder at the centre, with a round tie bar $2\frac{1}{2}$ in. diameter, morticed at each end for keys, 3 in. x 1 in. Each half girder is planed on the large end and jointed together at right angles to the top and side surfaces of the girder, severing these girders at the greatest point of strain, and connecting them as described above. When the table is erected and the keys are firmly driven it forms a continuous girder that is superior to a girder made in one piece, because the steel tie bars being more elastic than the cast members, and taking hold at the point of greatest strain, it is impossible to bring a sudden tensile strain on the cast members or the flanges of the girders. In other words, this arrangement protects the cast members from impact, and gives time for each member to adjust itself to the strain it receives.

The centre box is connected to the girders by two steel cross struts and four cast cross struts (see "C," fig. 23) and two cast pipe braces (see fig. 23), and in addition, for lateral bracing, the cross ties are notched to fit the top flange. The cross struts at centre are connected to the two continuous girders by 64 rivets 1 in. in diameter (driven in the field). They are planed vertical bearing of 80 sq. in. (see fig. 24).

The cast struts and pipe braces are connected to the girders by ten rods, $1\frac{1}{2}$ in. diameter. The centre box or sleeve (see longitudinal section of centre, fig. 25, and centre of plan on fig. 23) is connected to the centre cross struts with 52 rivets, $1\frac{1}{4}$ in. diameter. The platform is consequently rigid enough and yet flexible enough to swing the load clear of the supports at the outer end and yet not easily broken. The pedestal dimensions are given at "F" in longitudinal section shown on fig. 25. It is furnished with a cushion plate at base and the base of the cast pedestal is faced true in the lathe, drilled through the bottom flange, for 18 rivets, 1 in. diameter countersunk on upper side of pedestal and lower side of the wrought iron plate. The flange of pedestal is cylindrical, the wrought iron plate is square, leaving room for the four anchor bolts and nuts at the four corners of the base plate. This arrangement saves the pedestal from being broken by any undue strain and gives a greater surface bearing on the top of the centre stone. It is impossible to capsize a turntable constructed in this manner without some extraordinary force being brought against it, as for instance a locomotive running into the turntable pit, owing to a switch being left open.

The vertical load is entirely supported on the 16 conical rolls, made of tool steel hardened and ground, $3\frac{1}{2}$ in. long, tapering from $2\frac{1}{8}$ in. diameter to $1\frac{1}{8}$ in. diameter. These two housings are $15\frac{1}{2}$ in. diameter, $2\frac{1}{4}$ in. thick, with centre hole $5\frac{1}{2}$ in. diameter, with annular groove turned to same bevel as the rolls, which are also made of tool steel and are ground after hardening. The lower housing rests on the top of the pedestal, and is held in position by a projecting hub of the pedestal, $5\frac{1}{2}$ in. diameter by 1 in. high; the top end of pedestal and this projecting hub are turned so that the lower housing has a solid and true bearing on the pedestal and cannot be moved from the centre, becoming practically a part of the pedestal. The 16 rolls are interposed between the lower and upper housings, running free from axles in the annular groove, which is deep enough to hold the

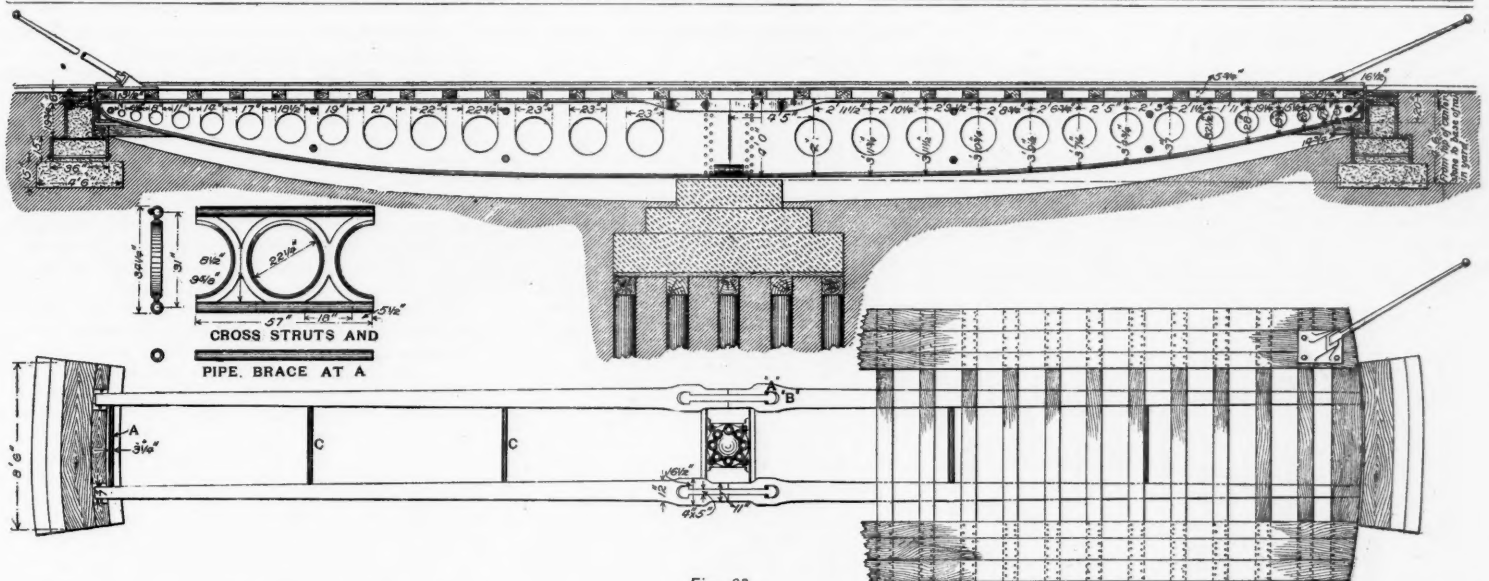


Fig. 23.

plane sides of the housings $\frac{3}{4}$ in. apart for wear. The hemisphere (see detail No. 4, fig. 27) is of cast "gun metal," 16 in. diameter. The lower side is faced off to fit the housing, and furnished with a projecting hub or dowel, $5\frac{1}{2}$ in. diameter and $3\frac{1}{2}$ in. long, passing down through the upper housing, and into the lower housing. The lower end of this dowel, when in place, is within $\frac{3}{4}$ in. of the upper end of the projecting hub that is cast and turned on the top of the pedestal. The upper side of the hemisphere is the lower half of the ball and socket joint on which the table balances. The dowel that passes down into the lower housing communicates all the end thrust of the table to the centre post at the top, and also makes a perfect oil strainer. The oil hole through the centre cap and hemisphere delivers the oil in the space between the top of the pedestal and the bottom of the hemisphere. The oil then has to rise around the dowel and pass through the annular groove in the housings, and overflows on the outside of the groove and runs down the pedestal on the

outside, and also lubricates the vertical rolls at the base of the pedestal, leaving all sediment or grit deposited in the space between the top of the pedestal and the hemisphere.

The turntable platform that receives the load is suspended on the top of the pedestal or centre post by eight suspender bolts, $2\frac{1}{4}$ in. diam., that pass through the bolt holes in the centre box or sleeve (see detail No. 1 on fig. 27) and cap (see detail No. 3, fig. 27). These bolts are all screwed up hard, to prevent undue strain coming on any one or more of them, and also to join the cap closely to the centre box that forms the friction sliding joint and keeps the dust from the roller bearing. The bolt holes are larger than the bolts, so as the table tips they will not come in contact with the sides of the holes in the centre box or cap, for as the table tips the vertical rolls near the base of pedestal prevent any lateral motion of the platform of the base. The platform, therefore, slides under the cap at the friction joint, and unless there was room round the bolts they would bind

or break. This makes the table entirely centre bearing in turning, for if there was a locomotive balanced on it, as described, it would need no outer support at the ends, which are only required to allow the locomotive to pass on or off the table. The space between outer end of girders and lock seat is 1 in., giving 1 in. vertical tip at outer ends of girders to lock and unlock turntable.

The automatic lock is a simple casting (see detail No. 6 on fig. 27) bolted to the wooden curb, G, on fig. 26, and is the exact height, so that, when the turntable girders seat themselves by the weight of the locomotive passing on the table, the rail on the table comes at the end used to the same line and surface as the yard track, and is held securely in that position until the locomotive passes off of the table (see end view, showing automatic locking device at G, fig. 26).

The circular piece or curb, 8 in. by 8 in., to which the locks are bolted, and the coping of the end supports are of wood, because masonry is not satisfactory at these

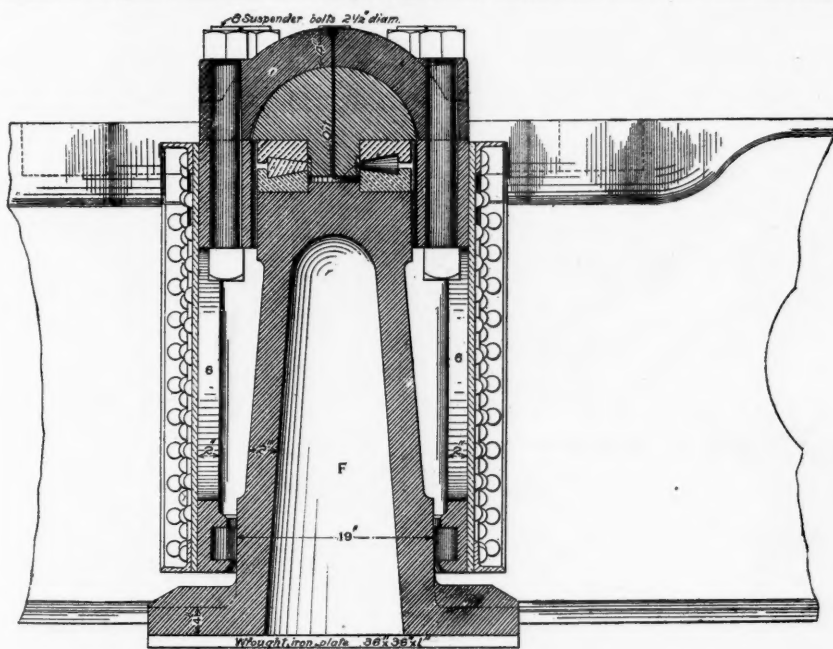


Fig. 25.

Longitudinal Section at Centre.

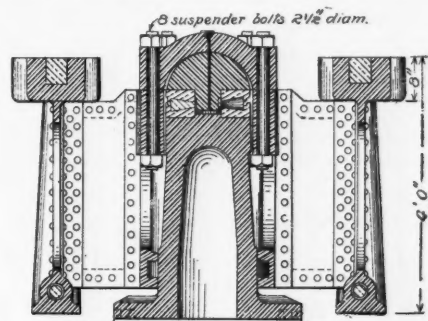


Fig. 24.

Cross-Section at Centre.

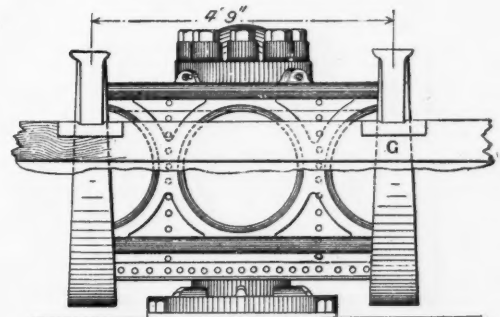


Fig. 26.

End View, Showing Automatic Locking Device.

THE GREENLEAF STANDARD TURNTABLE, 1892. LENGTH, 66 FT.; CAPACITY, 120 TONS.

THE EVOLUTION OF THE RAILROAD TURNTABLE.

points, owing to the expansion and contraction of the yard rails loosening stone coping. Masonry end supports are thrown out of level by frost. While wood does not resist the weather and soon rots, it is less expensive to renew the wood than to repair the masonry. Timber looks better than masonry except when the latter is new.

The table is furnished with two levers and sockets for turning (see fig. 23).

Where masonry is expensive, this table can be arranged with centre and end castings to be filled with concrete (see masonry on side elevation and plan on fig. 23). The side elevation on fig. 23 shows piling foundations for the centre. If there is the slightest doubt as to solid bottom, it is much cheaper to put the piles in at first. If the foundation is bad, the table is sure to give trouble, and must be removed in order to drive the piles,

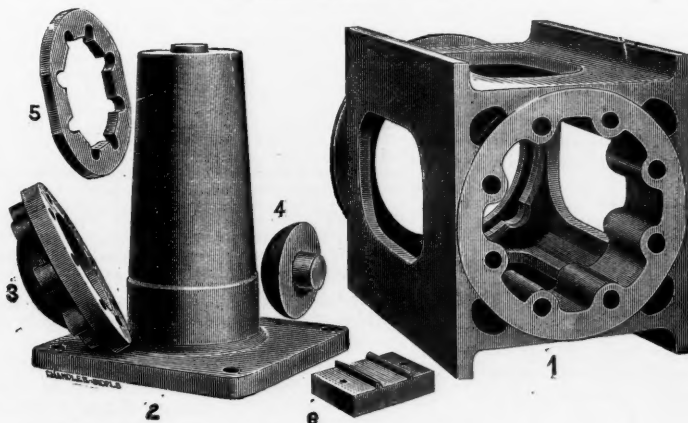


Fig. 27.

DETAILS.

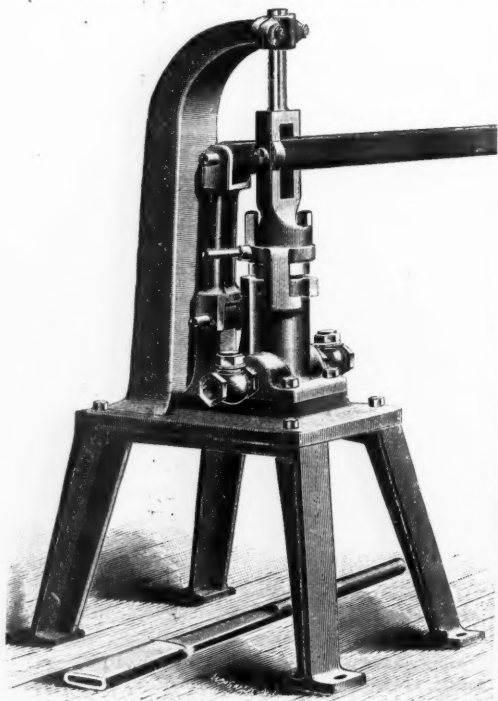
1, Centre Box; 2, Pedestal; 3, Cap; 4, Hemisphere; 5, Friction Ring; 6, Lock.

Portable Testing Pump.

The accompanying illustration represents a low-pressure hydraulic testing pump made by the "W. & S." (Watson & Stillman) Hydraulic Machinery Works, of New York.

This pump is designed for low-pressure work not exceeding 800 lbs. pressure per square inch, and is fitted with a double piston, the larger having a diameter of 3 in. and a stroke of 4 in., and is capable of giving a pressure of 200 lbs. to the square inch, while the smaller one (1 1/4 in.) can give the maximum pressure—800 lbs.

The pump is fitted for ordinary steam pipe connec-



Portable, Low-Pressure, Double Testing Pump.

tions, 1 in. in diameter, and is mounted on a platform having four legs or wheels of good size as desired, making it convenient in moving and stable while pumping. The change from large to small piston is made by throwing a latching clutch.

The valves are conveniently placed and of the best construction.

Standard Duplex Steam Pump.

The accompanying engraving illustrates an improved form of Duplex steam pump recently introduced by Messrs. Fairbanks, Morse & Co., of Chicago, Ill. It is adapted for boiler feeding, fire protection, hydraulic elevators and general service where the water pressure does not exceed 150 lbs.

One of the special features of the pump is that the water cylinders are made removable.

The removable water cylinder is held in position at the central bearing by a sectional binder, which admits of different sizes of removable cylinders being used, as any size can be taken out, rebored and returned without breaking any steam or water connections, and can also be made of any metal that the liquid to be pumped may require.

The water valve seat is screwed into the main casting of the water-box with a taper thread in which is screwed a valve stem formed in such a way that the valve can only rise to a limited extent, and is brought back to its seat by a straight coiled spring. As the valve can only rise to a shoulder in the stem, the spring is never overstrained. The life of the spring is thus preserved, while the lift of the valve being limited, it can always return to its seat promptly before the return stroke commences. A valve which does not seat promptly causes considerable concussion at each end of the stroke.

The water valve area is about one-quarter more than has ever before been used in standard makes of pumps. Another advantage claimed by the makers of this pump is the duplication of all parts of the steam valve adjustment. The arms, cranks, links, valve stems, slides and steam valves all duplicate one side with the other, thus minimizing the quantity of repair parts required to be kept in stock.

The valve stem is of steel and instead of being weakened, as is usually the case, it is strengthened by being covered with a brass sleeve on which the slides move, giving about three times the usual wearing surface, the sleeve being of cast iron and the bushing of bronze, two metals that wear well together. The adjustable nuts, which regulate the length of the stroke, are screwed on each end of this bushing, so that the valve stem can be lengthened or shortened for adjustment according to the work to be done.

An auxiliary port extends from each end of the steam cylinder in the exhaust port, which controls the amount of compression at each end of the stroke. This can be

closed to give a full cushion and opened to release any proportionate amount of the cushion, which the work may require.

The capacity of the various regular sizes of pumps is shown in the accompanying table:

Size of pump.				Gallons per stroke of one plunger.	Diameter of pipes.					
Water cylinder diameter.	Water cylinder length.	Plunger diameter.	Length of stroke.		Strokes per minute of each plunger.	Gallons delivered per minute by both plungers.	Steam pipe.	Exhaust pipe.	Suction pipe.	Discharge pipe.
2	3	3/4	3	.016	100 to 300	3 to 8	3/4	3/4	1	3/4
3	4	1	4	.05	100 to 250	10 to 22	1	1	1 1/4	1
4 1/2	5	1 1/4	5	.12	100 to 200	24 to 45	1 1/4	1 1/4	2 1/2	1 1/2
5	6	1 3/4	6	.20	100 to 200	40 to 80	1 3/4	1 3/4	3	2
6	7	2	7	.33	100 to 150	66 to 100	2	2	4	3
7	8	2 1/4	8	.42	100 to 150	84 to 126	2 1/4	2 1/4	5	4
8	9	2 1/2	9	.59	75 to 125	104 to 163	2 1/2	2 1/2	6	5
9	10	2 3/4	10	.85	75 to 125	127 to 212	2 3/4	2 3/4	7	6
10	11	3	11	1.22	75 to 125	145 to 255	3	3	8	7
11	12	3 1/4	12	1.47	75 to 125	165 to 285	3 1/4	3 1/4	9	8
12	13	3 1/2	13	1.72	75 to 125	187 to 327	3 1/2	3 1/2	10	9
13	14	3 3/4	14	2.00	75 to 125	212 to 367	3 3/4	3 3/4	11	10
14	15	4	15	2.40	75 to 125	240 to 400	4	4	12	11
15	16	4 1/4	16	2.81	75 to 125	271 to 450	4 1/4	4 1/4	13	12
16	17	4 1/2	17	3.24	75 to 125	304 to 500	4 1/2	4 1/2	14	13
17	18	4 3/4	18	3.69	75 to 125	339 to 550	4 3/4	4 3/4	15	14
18	19	5	19	4.16	75 to 125	376 to 600	5	5	16	15
19	20	5 1/4	20	4.65	75 to 125	415 to 660	5 1/4	5 1/4	17	16
20	21	5 1/2	21	5.16	75 to 125	456 to 720	5 1/2	5 1/2	18	17
21	22	5 3/4	22	5.69	75 to 125	499 to 780	5 3/4	5 3/4	19	18
22	23	6	23	6.24	75 to 125	544 to 840	6	6	20	19
23	24	6 1/4	24	6.81	75 to 125	591 to 900	6 1/4	6 1/4	21	20
24	25	6 1/2	25	7.40	75 to 125	640 to 960	6 1/2	6 1/2	22	21
25	26	6 3/4	26	8.01	75 to 125	691 to 1,020	6 3/4	6 3/4	23	22
26	27	7	27	8.64	75 to 125	744 to 1,080	7	7	24	23
27	28	7 1/4	28	9.29	75 to 125	800 to 1,140	7 1/4	7 1/4	25	24
28	29	7 1/2	29	9.96	75 to 125	858 to 1,200	7 1/2	7 1/2	26	25
29	30	7 3/4	30	10.65	75 to 125	918 to 1,260	7 3/4	7 3/4	27	26
30	31	8	31	11.36	75 to 125	980 to 1,320	8	8	28	27
31	32	8 1/4	32	12.09	75 to 125	1,044 to 1,380	8 1/4	8 1/4	29	28
32	33	8 1/2	33	12.84	75 to 125	1,110 to 1,440	8 1/2	8 1/2	30	29
33	34	8 3/4	34	13.61	75 to 125	1,178 to 1,500	8 3/4	8 3/4	31	30
34	35	9	35	14.40	75 to 125	1,248 to 1,560	9	9	32	31
35	36	9 1/4	36	15.21	75 to 125	1,320 to 1,620	9 1/4	9 1/4	33	32
36	37	9 1/2	37	16.04	75 to 125	1,394 to 1,680	9 1/2	9 1/2	34	33
37	38	9 3/4	38	16.89	75 to 125	1,470 to 1,740	9 3/4	9 3/4	35	34
38	39	10	39	17.76	75 to 125	1,548 to 1,800	10	10	36	35
39	40	10 1/4	40	18.65	75 to 125	1,628 to 1,860	10 1/4	10 1/4	37	36
40	41	10 1/2	41	19.56	75 to 125	1,710 to 1,920	10 1/2	10 1/2	38	37
41	42	10 3/4	42	20.49	75 to 125	1,794 to 1,980	10 3/4	10 3/4	39	38
42	43	11	43	21.44	75 to 125	1,880 to 2,040	11	11	40	39
43	44	11 1/4	44	22.41	75 to 125	1,968 to 2,100	11 1/4	11 1/4	41	40
44	45	11 1/2	45	23.40	75 to 125	2,058 to 2,160	11 1/2	11 1/2	42	41
45	46	11 3/4	46	24.41	75 to 125	2,150 to 2,220	11 3/4	11 3/4	43	42
46	47	12	47	25.44	75 to 125	2,244 to 2,280	12	12	44	43
47	48	12 1/4	48	26.49	75 to 125	2,340 to 2,340	12 1/4	12 1/4	45	44
48	49	12 1/2	49	27.56	75 to 125	2,438 to 2,340	12 1/2	12 1/2	46	45
49	50	12 3/4	50	28.65	75 to 125	2,538 to 2,340	12 3/4	12 3/4	47	46
50	51	13	51	29.76	75 to 125	2,640 to 2,340	13	13	48	47
51	52	13 1/4	52	30.89	75 to 125	2,744 to 2,340	13 1/4	13 1/4	49	48
52	53	13 1/2	53	32.04	75 to 125	2,850 to 2,340	13 1/2	13 1/2	50	49
53	54	13 3/4	54	33.21	75 to 125	2,958 to 2,340	13 3/4	13 3/4	51	50
54	55	14	55	34.40	75 to 125	3,068 to 2,340	14	14	52	51
55	56	14 1/4	56	35.61	75 to 125	3,180 to 2,340	14 1/4	14 1/4	53	52
56	57	14 1/2	57	36.84	75 to 125	3,294 to 2,340	14 1/2	14 1/2	54	53
57	58	14 3/4	58	38.09	75 to 125	3,410 to 2,340	14 3/4	14 3/4	55	54
58	59	15	59	39.36	75 to 125	3,528 to 2,340	15	15	56	55
59	60	15 1/4	60	40.65	75 to 125	3,648 to 2,340	15 1/4	15 1/4	57	56
60	61	15 1/2	61	41.96	75 to 125	3,770 to 2,340	15 1/2	15 1/2	58	57
61	62	15 3/4	62	43.29	75 to 125	3,894 to 2,340	15 3/4	15 3/4	59	58
62	63	16	63	44.64	75 to 125	4,020 to 2,340	16	16	60	59
63	64	16 1/4	64	46.01	75 to 125	4,148 to 2,340	16 1/4	16 1/4	61	60
64	65	16 1/2	65	47.40	75 to 125	4,278 to 2,340	16 1/2	16 1/2	62	61
65	66	16 3/4	66	48.81	75 to 125	4,410 to 2,340	16 3/4	16 3/4	63	62
66	67	17	67	50.24	75 to 125	4,544 to 2,340	17	17	64	63
67	68	17 1/4	68	51.69	75 to 125	4,680 to 2,340	17 1/4	17 1/4	65	64
68	69	17 1/2	69	53.16	75 to 125	4,818 to 2,340	17 1/2	17 1/2	66	65
69	70	17 3/4	70	54.65	75 to 125	4,958 to 2,340	17 3/4	17 3/4	67	66
70	71	18	71	56.16	75 to 125	5,100 to 2,340	18	18	68	67
71	72	18 1/4	72	57.69	75 to 125	5,244 to 2,340	18 1/4	18 1/4	69	68
72	73	18 1/2	73	59.24	75 to 125	5,390 to 2,340	18 1/2	18 1/2	70	69
73	74	18 3/4	74	60.81	75 to 125	5,538 to 2,340	18 3/4	18 3/4	71	70
74	75	19	75	62.40	75 to 125	5,688 to 2,340	19	19	72	71
75	76	19 1/4	76	64.01	75 to 125	5,840 to 2,340	19 1/4	19 1/4	73	72
76	77	19 1/2	77	65.64	75 to 125	5,994 to 2,340	19 1/2	19 1/2	74	73
77	78	19 3/4	78	67.29	75 to 125	6,150 to 2,340	19 3/4	19 3/4	75	74
78	79	20	79	68.96	75 to 125	6,308 to 2,340	20	20	76	75
79	80	20 1/4	80	70.65	75 to 125	6,468 to 2,340	20 1/4	20 1/4	77	76
80	81	20 1/2	81	72.36	75 to 125	6,630 to 2,340	20 1/2	20 1/2	78	77
81	82	20 3/4	82	74.09	75 to 125	6,794 to 2,340	20 3/4	20 3/4	79	78
82	83	21	83	75.84	75 to 125	6,960 to 2,340	21	21	80	79
83	84	21 1/4	84	77.61	75 to 125	7,128 to 2,340	21 1/4	21 1/4	81	80
84	85	21 1/2	85	79.40	75 to 125	7,298 to 2,340	21 1/2	21 1/2	82	81
85	86	21 3/4	86	81.21	75 to 125	7,470 to 2,340	21 3/4	21 3/4	83	82
86	87	22	87	83.04	75 to 125	7,644 to 2,340	22	22	84	83
87	88	22 1/4	88	84.89	75 to 125	7,820 to 2,340	22 1/4	22 1/4	85	84
88	89	22 1/2	89	86.76	75 to 125	8,000 to 2,340	22 1/2	22 1/2	86	85
89	90	22 3/4	90	88.65	75 to 125	8,182 to 2,340	22 3/4	22 3/4	87	86
90	91	23	91	90.56	75 to 125	8,366 to 2,340	23	23	88	87
91	92	23 1/4	92	92.49	75 to 125	8,552 to 2,340	23 1/4	23 1/4	89	88
92	93	23 1/2	93	94.44	75 to 125	8,740 to 2,340	23 1/2	23 1/2	90	89
93	94	23 3/4	94	96.41	75 to 125	8,930 to 2,340	23 3/4	23 3/4	91	90
94	95	24	95	98.40	75 to 125	9,122 to 2,340	24	24	92	91
95	96	24 1/4	96	100.41	75 to 125	9,316 to 2,340	24 1/4	24 1/4	93	92
96	97	24 1/2	97	102.44	75 to 125	9,512 to 2,340	24 1/2	24 1/2	94	93
97	98	24 3/4	98	104.49	75 to 125	9,710 to 2,340	24 3/4	24 3/4	95	94
98	99	25	99	106.56	75 to 125	9,910 to 2,340	25	25	96	95
99	100	25 1/4	100	108.65	75 to 125	10,112 to 2,340	25 1/4	25 1/4	97	96
100	101	25 1/2	101	110.76	75 to 125	10,316 to 2,340	25 1/2	25 1/2	98	97
101	102	25 3/4	102	112.89	75 to 125	10,522 to 2,340	25 3/4	25 3/4	99	98
102	103	26	103	115.04	75 to 125	10,730 to 2,340	26	26	100	99
103	104	26 1/4	104	117.21	75 to 125	10,940 to 2,340	26 1/4	26 1/4	101	100
104	105	26 1/2	105	119.40	75 to 125	11,152 to 2,340	26 1/2	26 1/2	102	101
105	106	26 3/4	106	121.61	75 to 125	11,366 to 2,340	26 3/4	26 3/4	103	102
106	107	27	107	123.84	75 to 125	11,582 to 2,340	27	27	104	103
107	108	27 1/4	108	126.09	75 to 125	11,800 to 2,340	27 1/4	27 1/4	105	104
108	109	27 1/2	109	128.36	75 to 125	12,020 to 2,340	27 1/2	27 1/2	106	105
109	110	27 3/4	110	130.65	75 to 125	12,242 to 2,340	27 3/4	27 3/4	107	106
110	111	28	111	132.96	75 to 125	12,466 to 2,340	28	28	108	107
111	112	28 1/4	112	135.29	75 to 125	12,692 to 2,340	28 1/4	28 1/4	109	108
112	113	28 1/2	113	137.64	75 to 125	12,920 to 2,340	28 1/2	28 1/2	110	109
113	114	28 3/4	114	140.01	75 to 125	13,150 to 2,340	28 3/4	28 3/4	111	110
114	115	29	115	142.40	75 to 125	13,382 to 2,340	29	29	112	111
115	116	29 1/4	116	144.81	75 to 125	13,616 to 2,340	29 1/4	29 1/4	113	112
116	117	29 1/2	117	147.24	75 to 125	13,852 to 2,340	29 1/2	29 1/2	114	113

Single Punching and Shearing Machine.

The illustration shows a heavy single punch and shear, with 18 in. depth of throat, made by the Hilles & Jones Co., of Wilmington, Del., and designated a No. 7 machine. This is a very massive, double-gear machine, and has sufficient capacity to punch 3 in. dia. holes in 2 in. thickness of iron, or to cut off 4½ in. square bars, cold. The cut shows the details of construction, engine, etc. There is an automatic stop which brings the sliding head to rest at any desired point of the stroke, the clutch being thrown in automatically by weights, as shown.

This machine is made in several different sizes, with a gap varying from 18 in. to 72 in. in depth of throat, and weighing as much as 100,000 lbs.

The eccentric shafts are of best hammered wrought iron, or steel if preferred. Journals for driving shaft are set at an angle, which permits the shaft to be removed

rivalry between masters tempting them to shorten their course by hugging the shore will be reduced to a minimum by the string of electric buoys. Each buoy will be provided with an arc light of 2,000 C. P. They will be strung along a route safe for both shallow and deep draught vessels. In accordance with the soundings made, the distance of the lights from the shore will vary from one-half mile to one mile and a half. The dangerous Hyde Park reefs, which have caused mishaps to so many vessels, will be clearly indicated.

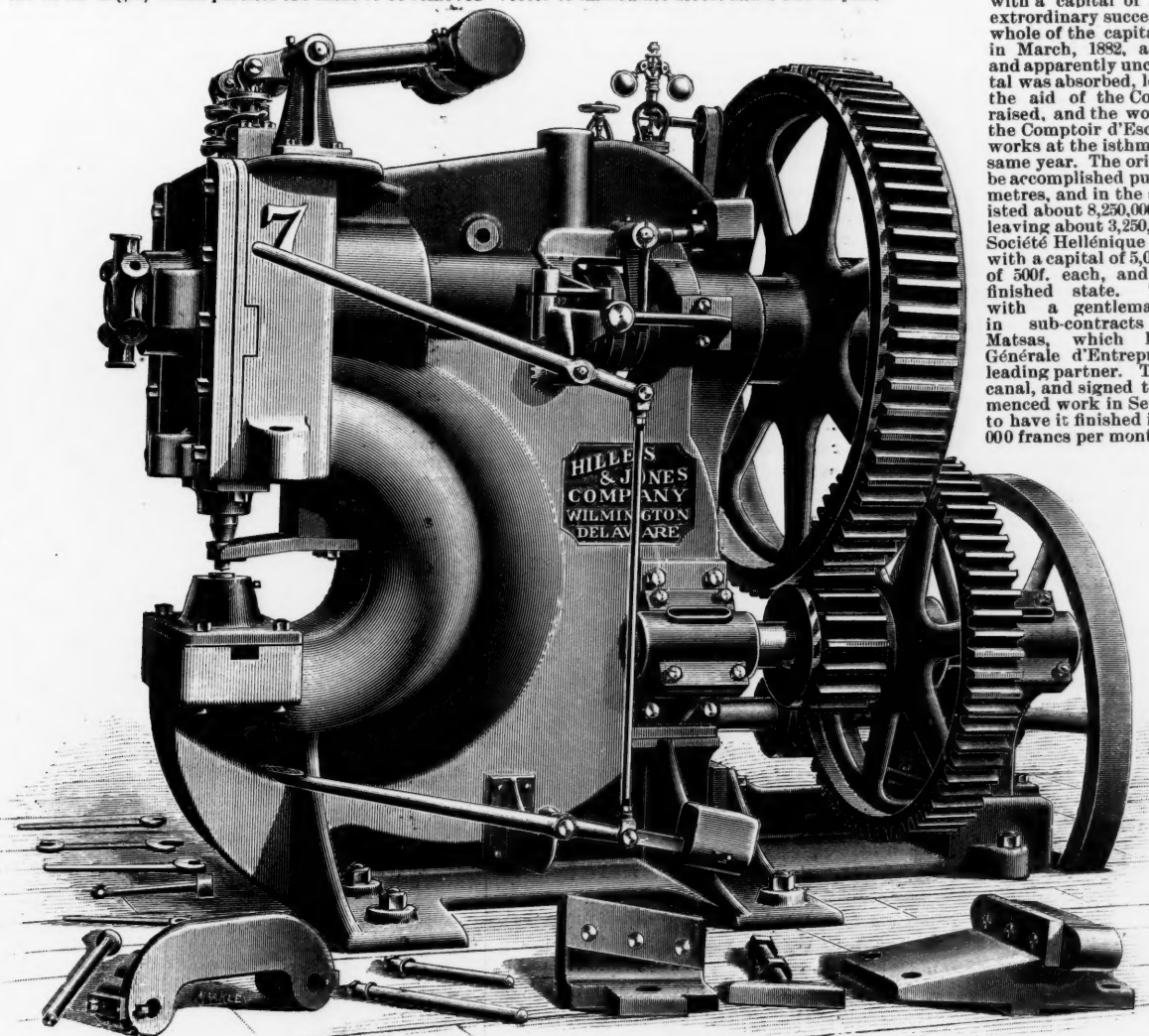
A United States revenue cutter will be constantly on duty to see that vesselmen obey the instructions of the Lighthouse Board. These are that all boats going southward shall keep to the west of the buoys both day and night, and that on northward trips all vessels must keep to the east of the buoys. The revenue cutter will be prepared for summary action, and any infraction of the regulations will subject the master of the offending vessel to immediate arrest and a fine of \$100.

The class with 84-in. drivers have averaged 69,000 miles per annum each since they commenced running, a very good record. The Greater Britain, which is somewhat larger and heavier than any others of this class and has a long boiler with two sets of flues, averaged only 33.7 lbs. per engine-mile, which would tend to show that this form of boiler produces economical results. Two of the 84-in. class engine have, however, consumed only 31.25 lbs. per engine-mile, which is equal to 30 lbs., excluding fuel consumed in lighting up.

The lowest consumption, 25lbs. per mile, has been on a tank engine working London suburban passenger trains running over part of the underground line.

The Corinth Canal.

The progress of the Corinth Canal is described by the British Consul in Piræus in a report lately issued by the Foreign Office. In 1881 General Turr floated a company with a capital of 30,000,000f., and, encouraged by the extraordinary success of the Suez Canal Company, the whole of the capital was subscribed. The works began in March, 1882, and went on, accompanied by lavish and apparently uncontrolled expenditure, until the capital was absorbed, leaving the canal unfinished; but, by the aid of the Comptoir d'Escompte, 14,000,000f. were raised, and the works went slowly on. In March, 1889, the Comptoir d'Escompte got into difficulties, and the works at the isthmus came to a standstill in July of the same year. The original calculation of the excavation to be accomplished put the amount at about 11,500,000 cubic metres, and in the seven years the original company existed about 8,250,000 cubic metres were really excavated, leaving about 3,250,000 cubic metres still untouched. The Société Hellénique du Canal de Corinthe was formed with a capital of 5,000,000f., and 23,333,500f. in obligations of 500f. each, and took over the works in their unfinished state. The company made a contract with a gentleman who had gained experience in sub-contracts in the Suez Canal named Matsas, which he handed over to the Société Générale d'Entreprises, a firm of which he was the leading partner. This firm undertook to construct the canal, and signed the contract in June, 1890, and commenced work in September, 1890, with an undertaking to have it finished in March, 1893, or pay a fine of 100,000 francs per month for any delay after that date. In January, 1892, however, a waterspout is supposed to have burst near Isthmia, and such torrents of rain flooded the canal works as to suspend all operations for some weeks, and on account of this the contractors have obtained two months' grace from the company, so that the actual date by which the works are now to be finished is May, 1893. On Nov. 1 last 2,720,000 cubic metres had been removed in 26 months, or a little more than 100,000 cubic metres per month, and only 380,000 cubic metres remained to be done; so that, if the same rate of progress could be maintained, only 3½ months more would have been required. But the contractors themselves state that the whole of the works will not be finished before the middle of April; but the Consul says that the present aspect of the works does not encourage him to hope that their prophecies will be realized. When it is finished the canal will have cost nearly £2,750,000, and whether it will earn enough to pay working expenses and interest is a problem which will be solved in the future.—The Times (London).



SINGLE PUNCHING AND SHEARING MACHINE.
Made by the HILLES & JONES Co., Wilmington, Del.

without disturbing the gearing. Sliding heads on all machines are counterbalanced, and on heavy machines the weight is connected through a heavy spiral spring as shown in the illustration.

The machine can be used for either punching or shearing, the tools for one operation being removed and those for the other substituted in a few minutes. The die blocks and shear blocks are held in place by through ream bolts, so that frequent changes can be made without injury to the main frame of the machine.

The engine driving the machine is bolted to a bracket cast on the main frame. The engines are of a heavy type especially designed for the purpose.

World's Fair Steamboat Service.

Capt. M. F. Symonds, Superintendent of Marine Transportation at the World's Fair, has received information from the Secretary of the United States Lighthouse Board that the appropriation of \$20,000 for establishing a line of buoys between Jackson Park and the Van Buren street pier has been approved by Congress. These buoys will be something new in the West. They will be lighted by electricity. Between the pier at Sixty-seventh street and that at Van Buren street there will be 14 of them, forming a line of light between the two points which will make steamboat navigation safe and easy. The idea of such a protection line originated with Capt. Symonds, who will have under his direction the fleet of electric and steam launches inside and outside the grounds, as well as the larger boats which are to ply between Van Buren street and the Park. It is expected that the Exposition will be open nights, and the dangers of

To further guide mariners as to their destination at Jackson Park there will be erected electric light towers at the outer end of the piers. The towers will be 125 ft. high. At their summit will be a corona of six electric arc lights, and in addition a mast light will shoot up 8 or 10 ft. above the corona. In the case of the south pier the mast light will be red; the north pier mast light will be blue. Navigators will thus be enabled to tell in an instant which pier they are approaching.

The steamboats will be under government inspection, the arrival and departure of vessels will be regulated by the Exposition Company, the staunchness of the boats must be satisfactory, and the service throughout will be constantly examined. The buoys to be used are known as the Edison buoys. The electricity will be furnished either by the Exposition Company or a specially constructed plant.

Performance of Webb's Compounds.

Mr. F. W. Webb, Chief Mechanical Engineer of the London & North Western (England), has just made public the performance of the compound engines on his line since they commenced running. The statement may be condensed as follows:

Class of engine.	Dia. drivers, in.	No. in class.	Total engine-mileage.	Total coal consumed, gross tons.	Consumption, lbs. per engine-mile, including lighting up.
Light express pass.	78	30	9,399,847	130,285	32.2
Express pass.	72	10	9,591,712	158,022	39.1
Various.	84	11	1,391,483	24,349	35.4
Various.	Various	4	595,208	7,626	Various
Total.		55	21,181,250	320,282	35.1

London to Berlin.

The authorities of the Great Eastern Railway in England, and the Traffic Manager of the Holland railways, have been in conference with the Prussian Minister of Public Works with the view to arranging for a new fast service between London and Berlin. The new route is from London to Harwich, and thence in a new steamer built on a novel plan in regard to berth accommodation to the Hook of Holland, instead of, as hitherto, to Rotterdam. The train awaiting the boat at the Hook of Holland conveys passengers by way of Rotterdam and Amsterdam over the Dutch Railroad to Rheine, which is in German territory, and thence to Löhne, where it meets the express from Cologne to Berlin. The Great Eastern Company intends to spend £750,000 in the construction of three luxurious steamers, which will make the sea trip in six hours.

The Lake Erie-Ohio River Ship Canal.

A project having for its object the construction and equipment by private capital of the long-talked-of ship canal between Lake Erie and the Ohio River is receiving the serious consideration of local capitalists in Pittsburgh. The first move will be made on March 20, at a meeting to be held in the Chamber of Commerce rooms in Pittsburgh.

The Elizabeth Improvement.

During the past week work has been pushed on the Pennsylvania elevation at Elizabeth, N. J., although much delayed by the weather. At the Broad street-Morris avenue crossing the foundation for the west abutment of the Central of New Jersey crossing has been about finished up to the topping off line. The excavation for the foundation for the centre pier of the two North Broad street arches is about completed. Trestling has been erected from West Grand street to Morris avenue and also between North Broad street and the Central of New Jersey tracks. As soon as the work on the foundations at the Broad street-Morris avenue crossing is finished the gaps in the present trestle for the two east tracks will be closed by the temporary crossing bridges and trains will cross the trestle. This, it is expected, will be done by April 1.



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EDITORIAL ANNOUNCEMENTS

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to all departments of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

In another column will be found an illustration of a coupler gauge devised by Mr. G. B. Hazlehurst, General Superintendent of Motive Power, and Mr. Francis J. Cole, Mechanical Engineer of the Baltimore & Ohio Railroad, for determining whether a vertical plane coupler after having been in service is safe to run. This is a very important matter and it is high time that it should be taken up in earnest. In the *Railroad Gazette* of July 5, 1890, and Aug. 8, 1890, we discussed the effect of wear of couplers in considerable detail, and gave diagrams showing the effect of wear, which has heretofore been one of the neglected matters in connection with vertical plane couplers, particularly in passenger service. The Baltimore & Ohio road is using the vertical plane coupler on all passenger trains, and the result of using the gauge for measuring wear has been a large decrease in the breaking apart of trains. Sixty of these gauges are now in use, and it is safe to say that couplers unsafe to run on account of wear or distortion of knuckles cannot pass inspecting points on the B. & O. We doubt if this is true of any other railroad in this country.

One advantage of a well proportioned compound locomotive is the saving in the amount of water used. On one of our trunk lines, a great deal of difficulty has always been found on one particular division in keeping up the boiler repairs. Flues are constantly leaking, and the life of the boilers is short owing to the excessive incrustation, though boilers are washed out after every round trip. On investigation it has been found that this trouble is almost entirely due to the water taken at one particular water station. Careful tests, however, show that the compound uses 38 per cent. less water than simple engines to do the same work. This remarkable result has been confirmed by the figures given by water meters and by calculations as to the amount of steam used as shown by the indicator cards. It is intended, therefore, to work this division wholly with compounds, when it is expected that it will be unnecessary to use the water at this particular point, and so avoid its bad effects on the boilers. Should this expectation be fulfilled, and there appears good reason to anticipate that it will be, the compound principle will be the means of effecting not only a saving in the amount of fuel and water used, but also in the cost of boiler repairs, while owing to the saving in time in washing out, etc., a smaller number of engines will be required to do the work.

The headlines of the strike news during the past week have been as exciting as ever, but it was difficult to find in the body of the reports any evidence of much disturbance until yesterday when there was an actual strike of enginemen on the Toledo, Ann Arbor & North Michigan, but not of great proportions. On Sunday a strike of Michigan Central

switchmen and switch tenders at Chicago was "imminent," but so far as we can learn it has not got beyond that condition. On Monday "all the managers in Chicago received a previously threatened notice" that the switchmen would strike on the 16th for higher pay and shorter hours, but the reporters do not succeed in getting anything but tame interviews from the managers. On the Toledo, Ann Arbor & North Michigan the brotherhood locomotive runners have been threatening to strike for some days, and have given the reporters half a column a day; they have got Mr. Arthur to come to them, and, if the reports are correct, this conservative leader has threatened to have his men on other roads boycott freight from the Ann Arbor road; but the latest reports indicate that the road secured a good number of new men and discharged some of the discontented runners before they got ready to strike. It is said that less than half the men went out, and the manager appears not to be distressed. There are indications that a number of roads have taken this way of preparing to meet the threats of employés. Agents have opened offices in New York, Philadelphia, Pittsburgh, Buffalo and Cincinnati, to conditionally engage men for work in other cities whose location is not made public. Indeed, this slowness of the alleged uprising, which gives the roads time to prepare for a contest, is a strong incidental proof that those brotherhoods which really have some strength have no present intention of making an important move; they know better than to thus give away their plans when an important contest is intended. If the railroads are going to serious expense to gather men whom they may have to send home again, it indicates a marked change in the general policy of dealing with strikers. This has been done heretofore, but not to any great extent. Expenditures of this kind are certainly legitimate as a "war measure," and if the various classes of banded employés are going to keep up the policy of making their agitations continuous, month after month, it will be necessary for the railroads to adopt some vigorous course like this. The men should remember, however, that if they provoke such tactics it will react upon themselves. The amount of money available for wages depends a good deal upon net earnings, and these will certainly be reduced if roads pay money to men who do not go to work. A railroad manager who spends ten thousand or fifty thousand dollars for the purpose here referred to will very naturally charge the sum to his wages account, and he will thus be prepared with additional support for his argument that his expenditures for wages in the past have been large.

The 100-Miles an Hour Electric Railroad.

The popular faith in electricity is ready to accept anything as possible from that subtle agent; therefore, when it was announced that a railroad was to be built to run trains by electricity 250 miles at the rate of 100 miles an hour, the statement was swallowed whole, without question. When a stock-selling prospectus was issued broadcast and printed in the advertising columns of the principal newspapers, making the most extravagant and absurd claims, and offering a 29 per cent. stock for sale at 60 per cent. of its face value, no one seemed to think that there was anything queer in the performance. And when the company went before Congress, asking that their machinery might be brought in without duty because they were going to build an electric railroad to run 100 miles an hour, still no one seemed to see the absurdity of the demand. But it has always been impossible for us to take the Chicago & St. Louis "through by lightning" electric railroad seriously. The perpetual mystery as to details of machinery, the extremely generous claims of profits, the light touch on the hard places, and the demonstrably untrue statements have all combined to make us look at this enterprise as a cloudy castle—amusing but evanescent. But it appears to be pushed in good faith, and it is so alluring to the multitude that it seems to be a duty to subject it to a little cold analysis.

We wish it to be understood at the outset that we do not say that an electric railroad will never be built between St. Louis and Chicago; we do not say that such a road will not run trains at 100 miles an hour; we do not say that such an enterprise will not pay. But we do say that the published prospectus and advertisements of the Chicago & St. Louis Electric Railroad Co. must fill any careful and discerning man with doubt that the road will ever be built by that company; or that it could be operated if built; or that it would pay if operated; for we are bound to assume that the company has put its best foot forward in its prospectus. But when one comes to analyze that document, it is hard to know where to begin, if one is going to write with due regard to the time and pa-

tience of his readers, so many are its errors of statement or inference. One example of this is in the following extract:

Several steam roads have determined to adopt electricity as a motive power for special service; for instance, the engineers of the Wisconsin Central, the Illinois Central, the Pennsylvania and the Boston & Maine roads have made thorough investigations into the subject, and orders have been given which mean practically the introduction of electric power for the suburban traffic of all these roads.

This is almost absolutely untrue in the letter, and absolutely untrue in the inference that the reader is expected to draw. It is a fact that the officers of the engineering departments of several steam railroads have made careful studies of the possibilities of electricity as a motive power, but we venture to say that not one of the railroads mentioned above, or any other existing steam railroad (excepting of course street railroads), has given orders that "mean practically the introduction of electric power for the suburban traffic of all these roads." On the other hand we will say that it is the judgment of the officers who have made those studies that in the present state of the art such orders would excite the derision of their rivals, and would be followed by their own prompt dismissal. We are not now discussing the scientific question whether or not that conclusion is sound; we are merely saying that the words of the "through by lightning" prospectus are untrue.

Another statement of the same sort is this:

Valuable terminal facilities and entrances have been secured both in Chicago and St. Louis. At the St. Louis end the road will cross the Mississippi River over the Merchants' Bridge, and run over the new elevated structure of the Merchants' Terminal Railway, into the Union Depot. At the Chicago end the road will ultimately enter the city over the elevated structure now being built for the "Chicago Elevated Terminal Railway Company," and run into the latter's grand station at Twelfth and State streets, in the heart of Chicago. Temporary arrangements have, however, been made for entering the city over the surface tracks of another road running into one of the principal depots of Chicago.

In the prospectus appears a picture of the Merchants Bridge with one of the electric chicken coops running over it; also a beautiful picture of the Union Depot to be built in St. Louis, and a picture, from an ideal drawing, of the Chicago Elevated Terminal Station yet to be built. These pictures are labeled "terminus of the Chicago & St. Louis Electric Railroad in St. Louis" (or "in Chicago"). Of course terminals in the hearts of those cities, and tracks on which trains can be run at high speed into and out of those terminals, are an essential part of the project. But those terminals will cost a great deal of money, and the charge upon the earnings of the company will be practically the same whether they pay it in the form of rentals or in the form of interest on bonds; but we discern nowhere any suggestion of provision for meeting this charge in the estimates of first cost or of yearly expenses. In the light of the facts, however, it would seem to be premature to present any such estimates, for it is a fact that no contract of an kind exists between the Chicago & St. Louis Electric Railroad and the St. Louis Merchants' Bridge Terminal Railway. If the electric railroad is brought to the end of the bridge, the Bridge Company will probably take its business, but that is the most definite thing that can be said. But if there were a contract, it would have little value, as the tracks of the Bridge Company do not run into the Union Depot, and the electric road can only get there over the tracks of other companies with whom the Bridge Company has as yet no agreement. Moreover, the tracks of the Bridge Company are now so entirely filled with freight traffic that it is not in position to handle fast trains of any kind. The Chicago Elevated Terminal Railway is perhaps "now being built," but it would be difficult to put one's finger on the spot where it is being built. Whatever may be the merits of that project—and it has some great merits—the time of its completion is most uncertain. It would be a foolish thing to put one's money into a railroad that has no other way of getting into Chicago.

We are told that the project is "in the main founded on that which has actually been accomplished." In fact, it is "in the main" experimental. It is proposed to distribute the power from two central stations by multiphase currents, the generators being run at 500 volts, the current led to step-up transformers and the pressure raised to some high but unstated voltage, at which it is to be distributed over the line, which is divided into ten-mile electrical blocks. At each block step down transformers are to be used which reduce the pressure to 3,000 volts. There are to be two multiphase motors on each car. No such scheme as this has ever been put into practical operation, the closest approach to it being the Frankfort-Lauffen installation, in which the current was transmitted by a system somewhat similar to that proposed, but not in such great quantity and not to large multiphase motors. We be-

lieve that no multiphase motor of the capacity proposed, to work at a pressure of 3,000 volts, has ever been built, 2,000 volts being the highest pressure used, while the builders of electrical machinery prefer to use lower pressures on account of the difficulties of insulation. Further than this, we believe that no such motor has been used for railroad service at any speed, much less at 100 miles an hour; and it yet remains to be demonstrated how the necessary current can be taken from the trolley line at such a speed. This is considered by electrical engineers to be a difficult and unsolved problem. Supposing that no insurmountable difficulties exist in the electrical construction, the success of the line depends upon the transmission of the power by the multiphase system with step-up and step-down transformers, for the necessary efficiency cannot be obtained by any other means. The rational course would naturally have been to build an experimental motor and an experimental section of track, on which the unknown factors in transmission and construction could have been determined and could possibly have been solved, but nothing less than the construction of about 250 miles of double track rock-ballasted road will apparently meet the aspirations of the enthusiastic promoters of this scheme.

But if the electrical and mechanical difficulties of transmission can be overcome, there remain some other factors to be considered. It is said that the cars that are to be used are to weigh but 15 tons, all included. Each car is to carry two direct-connected motors with leading and trailing trucks, and is apparently to have a seating capacity of about 30 passengers, as well as space for baggage, express and mail matter. From the published drawings, which indicate an ideal simplicity of construction, the car appears to be somewhat over 50 ft. long. A fair average of the weight of American passenger coaches, including trucks, would be about 1,000 lbs. per foot of length, and the weight of one of these "through-by-lightning" cars, when the large size of the trucks, which are to carry driving wheels 6 ft. in diameter, is considered, would certainly be not less than this. Allowing for the wedge-shaped end of the car, we may take the weight of one car at not less than 44,000 lbs.

Multiphase electric motors of large capacity weigh about 75 lbs. per horse power, and, with such motors an efficiency of 92 per cent. can be obtained when working at their designed output. In order to maintain a speed of 100 miles an hour the motors must aggregate about 360 H. P. and would weigh about 27,000 lbs. This horse power is calculated by taking the air resistance at 10 lbs. per square foot of cross section, which is approximately the figure determined by Mr. O. T. Crosby in his well known experiments, and taking the frictional resistances at 10 lbs. per ton. The car and motors would therefore weigh about 35½ tons, instead of 15 tons as given in the prospectus. It would be extremely interesting to see the mechanical details of these cars which are to run at 100 miles an hour and the weight of which has been so underestimated. The only feature of which the designer seems to be quite certain is the nose to "cut the air."

Such are a few of the glaring absurdities of the official statements of the promoters of the "through-by-lightning" railroad. There are many others which are very tempting, but we refrain from following the subject further, out of consideration for the reader. It would be interesting, for example, to make an estimate of the cost of a double track railroad such as is proposed, equipped as this one must be, and to compare it with the estimates of the promoters. The possibility of getting a paying revenue from certain somewhat limited classes of through traffic is also an interesting subject for speculation. Finally, it is quite demonstrable that if such a service were required and could be paid for, it could be given by the existing steam railroads for less money than the proposed electric railroad can possibly give it for. But we have probably said enough to put the reader on his guard, and perhaps we have said more than the importance of the subject really warrants.

Keeping Small Stations Tidy.

Some of the duties of station agents and of the officer who should see that station agents' duties are performed are discussed by a Western correspondent in this issue. We suspect that the correspondent has been acting in the latter capacity himself, and that he is owing up to some of the deficiencies on his own road. It is possible that some readers may think that his paragraphs resemble those in the rule books under the head of "Station Agents," but there is a difference in one respect, and that is that this letter tells about

rules which have actually been disregarded, and which are disregarded on all roads more or less. To a person who has learned about a railroad mostly through its advertisements, which give prominence chiefly to gorgeous cars and one or two palatial terminal stations, the first ride over the road is likely to be a rude disillusioning. We do not know how much direct financial profit can be figured out by roads which, like the Boston & Albany, and the Pennsylvania, have introduced taste and refinement and order on their right of way, but the gain is probably fully as tangible as that resulting from putting on fifteen-thousand-dollar cars where ten-thousand-dollar ones would answer, or from paying five-dollar commissions on fifteen-dollar tickets. Pleasant sights along the road are cheap and valuable advertisements, and while it is true that neat and well appointed stations in small villages are often undeserved by the people of the village, if we may judge by their own stores, streets and parks, the railroad should set the standard of civilization.

The practical question of improving the appearance of small stations is beset with persistent difficulties, and the division superintendent must calculate on a long campaign. At many places, especially where freight and passenger business has to be done at the same office, where roads are often muddy and where only one waiting-room can be provided, a good deal of dirt is inevitable, and the courage of the agent will need much spurring, and a high degree of industry and faithfulness is necessary. Forty-five-dollar agents who have this are pretty likely to resign. To the station agent, keeping order is closely connected with keeping the premises clean. His building often fills the office of the corner grocery to a certain extent—though the company's oak chairs are not so easy to whittle as a mackerel barrel—and it is not always practicable to exclude the loafers as completely as they ought to be excluded. Especially where the post-office is in the station it is often the case that considerable slovenliness is inevitable. Local police magistrates do not like to enforce the law on loafers any more than they do on track trespassers. The most that the superintendent can do is to keep watch of his stations and see that the agent realizes the necessity of doing the best possible, and understands what that means.

The fact that a man who is neat in one line is inclined to be neat all around is well illustrated at many places on those roads which have established or encouraged flower-gardening. Stations where a few flowers have been started show improved appearance in other features. The more a station agent appreciates neatness the more grit will he have to clean out the loafers who befool his stove and other fixtures. Superintendents who think that the foregoing lecture and that of our correspondent are too long can summarize the whole in the one precept, to hold on to and encourage those agents to whom tidiness is natural.

Proposed Railroad Legislation.

The car-coupler and air-brake bill has finally got out of the "proposed" class, having been signed by President Harrison on March 3. Secretary Moseley is the proud possessor of the pen with which the President's signature was affixed.

The California Senate has refused by a vote of 19 to 18 to abolish the Railroad Commission. A San Francisco paper prints in full face type the names of the 19 Senators who voted in a way to please the Southern Pacific. Without regard to the question of "railroad influence," however, it is to be noted that this proposed remedy for unsatisfactory rates was an ill considered one. The Senate committee justly said that to abolish the commission and have the legislature fix freight rates would probably be jumping out of the frying pan into the fire. If the reports are correct, California has an inefficient board of commissioners, but the need is not for a new law, but for new men. The Traffic Association, in demanding that railroad rates be fixed directly by the legislature, apparently had no higher principle than that of fighting the devil with fire. The leader of this Association, Mr. Leeds, is an experienced railroad officer, and must know that rates fixed by legislatures are much more likely to be wrong than right; but he evidently deemed it to the interest of his Association to arouse the public in whatever way was found most available.

Connecticut evidently wants to imitate Massachusetts in the good work of abolishing grade crossings, but does not know how to go to work. A law has been proposed empowering the railroad commissioners to remove the most dangerous crossings "on roads which have not paid dividends for two years" by taking 20 per cent. of the taxes paid to the state by those roads. Connecticut is also considering a law to regulate electric railroads. One of the sections in the proposed bill prohibits the construction of such a road to parallel a steam railroad.

The Illinois Legislature has before it a bill to strengthen the law punishing railroad employes who negligently cause death. The extreme penalty is imprisonment for 20 years. Another bill in that state is one compelling

railroads to "keep a watchman at every main line switch when it is open." This probably emanates from the same brilliant mind which proposed, in connection with the Wann disaster, that all trains should reduce speed to 12 miles an hour while running through yards.

The bill reducing freight rates has been passed by the Kansas Senate. As, however, there are two legislatures in that state, we are unable to predict the final outcome. The Massachusetts Legislature has not so many demagogues as some of those in the wild and woolly West, but there are enough of them for all practical purposes, nevertheless. A bill has been introduced making 10 hours a day's work, and another fixing passenger fares at one cent a mile to all points within 10 miles of any city of 40,000 inhabitants.

North Carolina has repealed the law which forbids ticket brokerage, and the law requiring separate cars for negroes has been passed, to go into effect May 1. In Ohio it is proposed to compel all railroads to deliver every shipment of freight within four days after they receive it or after it comes into the State of Ohio, under penalty of \$25 a day. Whether this means \$25 on each shipment or \$25 per pound, is not stated. Three days' free time must be allowed on bulk freight for unloading.

In South Dakota the legislature has evidently got through regulating the railroads, the bill to fix rates having been indefinitely postponed, but the legislators have not lost their interest in transportation, by any means. They are still trying to earn their wages, and a joint resolution has been passed favoring the construction of a government railroad from Galveston, Tex., through Oklahoma, Kansas, Nebraska and the two Dakotas to the British lines. The Nebraska Legislature has passed a similar resolution, and the other states interested are expected to do likewise. Why they did not call for an elevated "rapid transit" line, or stipulate that there should be four tracks, we are at a loss to understand.

The Texas lawmakers are not satisfied to sit quiet under the blighting influence of the decision of the United States Court, and various members are urging each other to stir up the Railroad Commission to make itself felt. A resolution has been offered requesting the board to suspend the exemptions which were granted when it was found that the courts were sure to issue injunctions if the rates ordered by the commission were not withdrawn.

A bill was introduced by Representative McAleer, of Philadelphia, during the last days of Congress, "to reorganize the corps of Civil Engineers in the Navy and for other purposes." This bill, which was referred to the joint naval committee authorized to sit during the recess of Congress, provides that the corps of civil engineers now connected with the navy shall in future consist of twelve civil engineers and eight assistant civil engineers; that each year, for four years, two graduates of the Naval Academy shall be selected to take a post-graduate course in civil engineering in some of the technical schools of the country, so that all vacancies in the corps may be filled from graduates of the Naval Academy. This bill increases the number of civil engineers at the navy yards, which is insufficient to properly take charge of the dry docks and other work at present in hand, and it is urged that taking graduates from the Naval Academy and giving them a post-graduate professional course will insure officers who have selected a life in the naval service, who are devoted to its interests, and have, presumably, the ambition to reflect credit upon it. This seems to be mixing two rather dissimilar callings. It is highly probable that neither a competent naval officer of the line nor a competent naval engineer will have time to make himself a civil engineer fit to design and construct the large docks and other important works now required about a navy yard, and it is certain that no civil engineer who keeps abreast of his profession will have time to fit himself as a naval officer. It would seem to be wiser to open the corps for the graduates of any of the several high-class engineering schools of the country. This would give an immensely greater range for selection and would, we take it, improve the personnel of the corps without any sacrifice of proper esprit de corps. There is this, however, to be said of the plan, that it will give a highly educated body of men who will have had the advantage of a six years' course instead of four, and who will also have had the advantage of a valuable special education in the Naval Academy.

Sentiment still has a place in railroad affairs. The locomotive which some Erie engineers are having built for the World's Fair has been designed, they say, partly to show that they have correct ideas of grace in a locomotive. When we see some of the "boot-leg" smokestacks now in vogue, and the cabs that resemble a New England cider-mill, we are inclined to sympathize with these men. Again, a writer in a New York paper who recently complained of various things in the management of the Manhattan elevated road, wanted the trains to run around the city, making a complete circuit, so that the engines would not have to run backward. He would even use a turn-table rather than torture passengers who, like himself, are reminded of a crab when they see an engine running with the chimney at the hind end. (We have always understood that crabs prefer to move sidewise and usually do, but probably this was the best simile our friend could scare up). But the melancholy

feature of this episode appears when we tell this aesthetic passenger that the Forney engines on the elevated run backward when they run forward. If he is not an Irishman he may not appreciate the force of this explanation, but if he will look at one of the engines with care he will see how it is. Mr. Forney's early drawings showed a flag on the leading end of the engine, with an imaginary head wind blowing it back. This served to soften the shock caused by seeing the chimney at the tail end. The men who build Forney engines nowadays have not time, however, to put on flags or figure heads, and so taste and beauty languish.

It appears that the Fitchburg road has made a contract by which its passenger trains will use the new station of the Boston & Maine in Boston as soon as it is ready, which will be some time during the coming summer or fall. No details are given, but the report is authentic. This, with the abolition of the Haymarket Square station, will constitute a marked amelioration of the complicated crossing and station problem on the north side of Boston. It is true, as the complainers say, that the enlargement which the Boston & Maine is making, to convert the present station of the Lowell division into a passenger terminus for all its own trains and those of the Fitchburg, is not an adequate solution of the question. A larger and more convenient station will be needed as soon as it can be made. But to stop the crossing of each other's tracks by the scores of passenger trains will be well worth while. Four grade crossings will be done away with; those of the Fitchburg with each of the three divisions of the Boston & Maine, and that of the Eastern division of the Maine with the Western division of the same. This can be done with comparative facility, while not interfering with the larger problem of raising the tracks so as to avoid the streets.

The bill to open to the architects of the country the designing of public buildings has become a law. The Secretary of the Treasury is authorized to get plans and specifications and local supervision by competition among private architects. The result ought to be an improvement in the external appearance and internal arrangement of our public buildings, which are unrivaled for badness in both particulars. But the choice of architects, or of engineers, by competition presents some difficulties, and it is in this respect that the bill as passed is inferior to the one prepared by the architects. The preparation of competitive plans for a great building is very expensive, and the best architects do not like to go into unrestricted competitions. In fact, we may say that as a rule they will not go into such competition. Probably the best plan is to ask a few men of established reputation to compete and to pay them something for their designs whether they are accepted or not. This idea was embodied in the bill as originally drawn, but this essential feature was amended out of it in the Senate. It is a mistake to suppose that the very remarkable group of designs for the World's Fair buildings were got by competition. The architects were selected for the different buildings for their known abilities and were well paid.

Railroad matters in New England, and the influence of Mr. McLeod on them, remain unchanged, as far as the public is permitted to know. The directors of the New Haven road and those of the Boston & Maine have had friendly conferences, which are supposed to indicate that some of the latter are inclined to oust their President, but nothing definite is given out. The New Haven road can make a little money by carrying, between Simsbury and Northampton, what freight and passengers the Boston & Maine and the Reading roads may have to exchange with each other; but, aside from this, it is hard to see what "strong traffic alliance" can be possible. New York & New England stock has sold as low as 25 this week, indicating that the control of that road is still a matter of doubt. Evidently nothing definite will be known until the annual meeting next Tuesday. But there are no more "strategic" small roads to buy up and no available money to build new ones with, so we cannot see how a change in the New York & New England, or even in Boston & Maine, can affect the general situation materially. The fortunes of the New York & New England are now of little interest except to its owners. President Parsons has issued his annual report this week, giving detailed evidence of very bad management by his predecessors.

The Norfolk & Western has adopted a very simple method of simplifying freight car bolster springs. A standard coil has been adopted of $\frac{1}{2}$ in. dia. bar, the coil being 5 in. dia. and $6\frac{1}{4}$ in. high. Six of these coils are used in each group for 60,000-lb. cars, five make a group for 50,000 lb. and four for 40,000-lb. cars. Each coil is therefore equivalent to 10,000 lbs. of capacity. The coils and plates are purchased separately and no bolts are used, thus saving 24 bolts in a 60,000-lb. car. The bolts simply serve as a convenience in packing, keeping the group intact, but are of no use when the car is running. As, however, but one kind of coil is used for all sizes of car, there is no particular use in keeping the groups together. When repairing, the proper kind of plate must be used, but any coil will fit any plate, and the whole can be easily assembled. This is one of the many economies now being introduced in car construction, which appear insignificant when applied to a sin-

gle car, but become of great importance when used on a million cars.

Congress finally appropriated nearly \$200,000 for special compensation for fast mail trains, but it is not clear what roads will get the money. The bill says that the \$196,647 appropriated shall be paid for expediting the mail service from Springfield, Mass., via New York and Washington to New Orleans and Atlanta, but some of the members interested understand that the Postmaster General may, if he choose, divert some of the money to other routes, the Western Maryland, for instance. The passage of this item of the appropriation bill seems to have been secured by the log-rolling methods so common with other appropriations near the close of Congress, and the equities of the case receive little consideration. We understand that the New York, New Haven & Hartford road's share of the money is for a train of which the chief business is not to or from the South, and that the lines between New York and Washington get none at all. Why the Atlanta line should be favored when the Atlantic Coast Line, heretofore allowed special pay, is left out, does not appear.

Mr. Charles D. Law, Superintendent of the Western Division of the Pittsburgh, Fort Wayne & Chicago, was indicted for murder at Chicago last week, along with two crossing tenders and a locomotive runner. The indictment is in connection with the fatal accident at the Forty-seventh Street crossing, Dec. 29, last, when four persons in a street car were killed. Mr. Law lives in Indiana, however, and the tone of the dispatches indicates that no attempt has been made to bring him within the jurisdiction of the Chicago courts. Evidently the indictment was made and published largely for effect. If reports are correct, the accident of Dec. 29 was one in which the crossing watchmen and the locomotive runner were negligent, and it would very likely be a just punishment of the road for not maintaining better discipline if the courts were to inflict upon it a very heavy fine; but an indictment for murder is calculated to defeat itself. Our laws will have to be made more like those of Russia before that method will work.

TRADE CATALOGUES.

The Evolution of Artificial Light from a Pine Knot to the Pintsch Light. Passenger Department, Union Pacific System, Omaha, Neb.

The Passenger Department of the Union Pacific system has issued a very well printed and prettily illustrated pamphlet under the above title. To be sure the pamphlet, of 108 pages, has not nearly as much to say about the evolution of light as one would suppose from the title; still it does convey considerable information on that and other matters. The author has compiled some information about the crudest methods of procuring light, and as he journeys down through the ages contrives to tell us in a more or less coherent way a good many facts and conjectures about what humanity has done in the way of trying to dispel darkness. The man who is looking for science or history will probably be disappointed, but the railroad traveler who has the fortune to pick up a copy of the pamphlet will find it interesting reading for an hour or two. The last 30 pages has nothing whatever to do with light, but is a running account of the Union Pacific Railroad, with some good and characteristic pictures.

The Foster Engineering Co., of Newark, N. J., have just issued a catalogue of their products, steam pressure regulators, pump governors and reducing valves for steam, water, gas and air. The various appliances are well and clearly illustrated and described. The McDowell inside safety check valve for locomotives is also illustrated, and the catalogue states that 3,000 of these check valves are now in use on the Pennsylvania, and that it is also largely used on the Philadelphia & Reading, Chesapeake & Ohio and other large roads. This valve appears well calculated to prevent the fatal cases of scalding which often occur when outside check valves are wrenched off in a collision or derailment.*

Air Compressors—Duplex and Single. Clayton Air Compressor Works, 43 Dey street, New York City.

These Works have just issued catalogue No. 7, showing air compressors in considerable variety, actuated by steam, belt, gearing or water power. The catalogue shows also governors, pumps, boilers and other material required in this line of work. Tables and prices of capacity are also given.

The Changes on the Pennsylvania.

Last week we gave a brief outline of the changes that have just taken place in the organization of the executive department of the Pennsylvania Railroad Company. They are mostly in the personnel and in the way of promotion; but some new offices have been created and certain changes have been made in the duty of the officers under the old titles. The duties of the President are unchanged.

The duties of the First Vice-President have heretofore been general charge of the transportation, freight and passenger departments; special charge of relations with

competing and connecting companies; to aid the President in all matters, and to exercise a special supervision over the receipts and disbursements of the transportation department. This last function is now shifted to the Third Vice-President, under the First; but a new clause in the rules of organization is that the First Vice-President shall, "under the direction of the President, attend generally to the executive business of the company." Probably the purpose is that this officer shall relieve the President of part of his present cares. This office is still held by Mr. Thomson.

The Second Vice-President has heretofore had charge of the insurance and treasury departments and supervision of the financial matters of all the corporations in which the company has a pecuniary interest. He is responsible for the discipline of those departments and aids the President generally. He has also had supervision of all construction work, and of promotion and construction of new lines. By a change in the organization last June the office of Assistant to the President was created, whose duty it was to assist the President in engineering questions pertaining to the construction or improvement of any of the lines. By the last change the supervision of construction work is transferred to the Third Vice-President, and the promotion and construction of new lines to the Assistant to the President. The Second Vice-President takes on the new duty of assisting the President in the operation and management of the lines west of Pittsburgh and Erie. This duty has heretofore been performed by the Third Vice-President. He also takes from the Third Vice-President the supervision of the accounting department. Mr. John P. Green, formerly Third Vice-President, is made Second, in place of Mr. Du Barry, who died recently.

The former duties of the Third Vice-President in regard to the Western lines and the accounting department have gone up, with the incumbent, to the Second, as stated above. The Third takes, instead, the transportation, freight and passenger departments under the First Vice-President, and supervision of construction work formerly under the Second. This office is now held by Mr. Charles E. Pugh, formerly General Manager.

The Chief Engineer was formerly assistant to the General Manager in Maintenance of Way, and reported to him in all things. He was also responsible for all bridges, buildings and structures, new and old. He now has charge, under the Third Vice-President, of all new construction work on roads owned, controlled or operated, and prepares plans, etc., for all bridges and important structures. He has charge of construction accounts and of rail accounts and distribution of rails. Mr. Wm. H. Brown still fills this office.

The office of Chief of Motive Power has been created and Mr. T. N. Ely has been brought from Altoona to Philadelphia to fill it. The following is the official statement of his duties:

The Chief of Motive Power will have general supervision of the Motive Power Department, so far as may be necessary to preserve the standards and systems of the company and insure adherence to the same. All plans for locomotives, rolling and floating equipment will be submitted to him by the General Manager for approval as standard.

He will keep himself informed as to the condition and capacity of the shops and other facilities for the proper maintenance of the equipment of the company, and make to the General Manager such reports and suggestions as may be necessary.

He will confer with the purchasing agent in reference to the purchase of tools, machinery, material and supplies for use in the Motive Power Department, and will keep in his office a record of all patents owned or purchased by the company, the originals of which must be deposited with the Secretary, and will see that the proper officers are informed concerning the rights of the company therein.

He will have charge of the organization of the Car Trusts, keep himself advised of the leases and other arrangements connected therewith, and keep a record of the equipment furnished thereunder, and will perform such duties in connection with the motive power and equipment of the lines west of Pittsburgh and Erie and the facilities for the construction and maintenance of the same as may be assigned to him by the President.

The duties, new and old, of the Assistant to the President have been indicated above. In his duties in the promotion and construction of new lines he will be assisted by an Engineer of Branch Lines. Mr. Samuel Rea remains as Assistant to the President, and Mr. J. U. Crawford is made Engineer of Branch Lines, his former title of Assistant to the Second Vice-President having been abolished.

Mr. S. M. Prevost, formerly General Superintendent of Transportation, is promoted to be General Manager, but we do not see that the duties of the office are substantially changed.

The office of Engineer of Maintenance of Way has been created, and Mr. Joseph T. Richards, formerly Assistant Chief Engineer, has been appointed to the new office and the old title abolished. This officer takes those duties in which the Chief Engineer formerly acted as Assistant to the General Manager, as related above.

These are all of the more important changes that have been made in the organization, both as regards assignment of duties and changes in personnel. It will be seen that one important feature of them is in carrying up the duties with the promotion of the man who formerly performed them, so that while officers get merited advancement they are not promoted into comparative inefficiency.

* This inside safety check valve was illustrated in the *Railroad Gazette* on page 513 of the issue of July 24, 1891.

Boiler Explosions.

The valuable little monthly published by the Hartford Steam Boiler Inspection & Insurance Co., *The Locomotive*, gives in its February issue a number of tables summing up the work done by the company in inspection, and the statistics of boiler explosions collected by the editor. We reproduce three of the tables more or less condensed.

During the year 1892 cur inspectors made 74,830 visits of inspection, examined 148,603 boilers, inspected 59,883 boilers, both internally and externally, subjected 7,585 to hydrostatic pressure, and found 681 unsafe for further use. The whole number of defects reported was 120,659, of which 11,705 were considered dangerous.

SUMMARY FOR THE YEAR 1892.

	Whole number.	Dangerous.
Deposit of sediment.....	9,196	513
Incrustation and scale.....	13,351	811
Internal grooving.....	1,043	209
Internal corrosion.....	3,684	146
External corrosion.....	8,647	591
Defective braces and stays.....	1,742	572
Settings defective.....	3,370	301
Furnaces out of shape.....	4,541	292
Fractured plates.....	2,436	658
Burned plates.....	2,142	371
Riveted plates.....	3,164	446
Defective rivets.....	20,727	935
Defective heads.....	1,097	219
Leakage around tubes.....	22,428	3,133
Leakage at seams.....	4,901	353
Water gauges defective.....	3,701	544
Bow-out defective.....	1,456	363
Efficiency of water.....	261	101
Safety valves overloaded.....	701	210
Safety valves defective.....	947	301
Pressure gauges defective.....	5,227	445
Boilers without pressure gauges.....	75	75
Unclassified defects.....	1,095	30

Totals	120,659	11,705
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CLASSIFIED LIST OF BOILER EXPLOSIONS IN THE YEAR 1892.

SAFETY ASPECTS OF BOMBING EXPLOSIONS IN THE YEAR 1952	
Sawmills and other woodworking establishments.....	79
Locomotives.....	33
Steamships, tugs and other steam vessels.....	11
Portable boilers, hoists and agricultural engines.....	24
Mines, oil wells and collieries.....	13
Paper mills, bleacheries, digesters, etc.....	13
Rolling mills and iron works.....	21
Distilleries, breweries, dye works, sugar houses and rendering works.....	2
Flour mills and grain elevators.....	6
Textile manufactories.....	2
Miscellaneous.....	71
Total number of explosions.....	269
Persons killed.....	208
Persons injured.....	442

SUMMARY FOR 14 YEARS.

YEAR.	Explosions.	Killed.	Injured.
1879.....	132	208	217
1880.....	170	259	555
1881.....	159	251	313
1882.....	172	271	379
1883.....	184	263	412
1884.....	152	241	251
1885.....	155	220	278
1886.....	185	254	314
1887.....	198	264	388
1888.....	246	331	505
1889.....	180	304	433
1890.....	226	214	351
1 91.....	277	265	371
1902.....	269	298	442
Totals....	2,685	3,684	5,185

Erie Engineers' Exhibition Locomotive.

A number of the locomotive engineers on the Eastern Division of the New York, Lake Erie & Western have formed a stock company to build a locomotive for exhibition at the World's Fair, and the engine is now under construction at the shops of the Cooke Locomotive & Machine Company, Paterson, N. J. The aim of the engineers was to build a locomotive designed "on common sense ideas," and they hope to educate men of their craft who visit the Fair, and inspire them with the ambition to be not merely runners but engineers. The design seems to have been made by a committee. The money was raised by the sale of stock at \$5 a share. Numerous parts and appliances have been donated by manufacturers, so that the cost to the enginemen will be not more than one-half the total value of the engine.

The officers of the association are: E. Kent, President; C. Caskey, Vice-President; B. Scribner, Treasurer, and John H. Woods, Secretary. The engine is an eight-wheel (American type) passenger locomotive, with straight boiler and extension front. The principal dimensions are:

Cylinders, dia. and stroke.....	Inches	19 by 26
Driving wheels, dia. on tread.....	"	72
" journals, dia. and length.....	"	8½ by 12
Truck wheels, dia. on tread.....	"	33
" journals, dia. and length.....	"	6 by 10
Wheel base, driving.....	"	102
" " truck.....	"	72
" " engine, total.....	"	23 ft. 6¾
Boiler, mean dia.....	"	66
" height centre above rails.....	"	8 ft. 5¾
Flues, No. and dia.....	"	265
" length.....	"	145
Firebox, length and width.....	"	126 by 41½
Total heating surface, about.....	Sq. ft.	1,850
Grate area.....	"	36

It will be seen that the engine has plenty of grate area and bearing surface, and will be a very heavy and powerful machine.

An Elevated Railroad in Cleveland.

The project of building an elevated road in Cleveland, Ohio, from the business part of the city to Euclid Heights, an eastern suburb, is said to be "an assured fact." Press dispatches say that work will be begun as soon as the route is decided upon and a charter obtained—two rather troublesome elements, by the way. The road will be about seven miles in length.

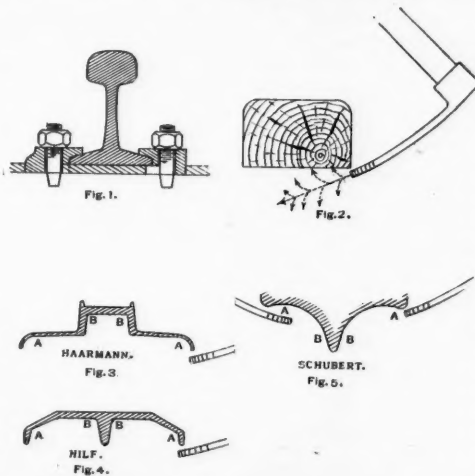
Some German Ideas on Railroad Ties.

Railroad ties, metallic and wooden, were very fully discussed at the November meeting of the Verein für Eisenbahnkunde, a report of which is given in Glaser's *Annalen für Gewerbe und Bauwesens* of Dec. 15, 1892.

Major Ronneberg expressed himself in favor of wooden ties with tie plates. He believed that the wooden ties made much the more comfortable track to ride on. Sand and gravel get between rail and tie, and the vibratory and wave motions of the rail then grind into the tie with every passing train. With wooden ties this cutting action is very rapid, and if the ties be preserved it becomes a serious matter; for the effect of the treatment is only to preserve a thin skin on the outside of the tie, which, being cut through, exposes the entire tie to the action of the atmosphere.

If the ties be of iron, the grinding action is just the same, only slower. If the rails be laid on iron stringers, the cutting action is all the worse. Major Ronneberg cited an instance where rails cut half way through iron stringers laid in a tunnel in a very short time. He ascribed this to the fact that the stringer could not follow the wave motion of the rail, consequently there was a space between rail and stringer between every set of wheels into which sand and gravel would be blown by the currents of air generated by the moving train. The grinding action of this, aided by the gases, produced the rapid wear of the stringers.

When a tie plate is used, part of the pound of the rail is converted into heat between rail and plate. The rest of it is distributed over a much larger area and becomes proportionately harmless. The use of the tie plate applies equally well to wooden or iron ties; also, when the rail is fixed firmly to the tie the vibration of the rail loosens the tie in its bed. He had tried to hold the tie by covering it entirely over with ballast, but after a few weeks he found the ballast had been shaken down till the ties were exposed. It had been sought to obviate this loosening action on the Militärbahn by increasing the length of the ties from 7 ft. 6 in. to 8 ft. 3 in., and lastly to 8 ft. 10 in. This last tie had been giving good satisfaction for a year. He believed the use of a tie plate would obviate the difficulty and be cheaper.



Major Ronneberg also mentions a difficulty they encountered on the Militärbahn in bolting the rail to the iron tie. The bolt used had a square portion under the head which rested against the flange of the rail. It was found that the flange cut deeply into this square section of the bolt in a very short time—a fact all the more alarming because the defect could not be discovered until the head of the bolt broke off or the bolt was removed. It was sought to overcome this difficulty by using a small cast-iron clamp, as shown in fig. 1. This device had not yet been long enough in use to demonstrate whether it would be effective or not.

Mr. Hohenegger described what he considered the best tie plate. It is a soft steel rolled plate, 5 in. wide, $13\frac{1}{2}$ in. long. In rolling, ridges are formed across the plate, two on one side to hold the rail, and one on the other side to hold the plate from shifting laterally of the track on the tie. These ridges or lugs are brought to the desired shape by means of a hydraulic press. The rail is fastened to the plate with a gib and key. The lugs have the ends rounded back away from the rail so that when gib and key are in place they can be slightly upset or spread into these rounded ends so as to prevent backing out. The key is purposely made a trifle wider than the space allowed for it, so that when driven home it springs the lugs apart slightly. When a weight is applied to the rail, the tendency of these lugs is to close like the jaws of a vise and bite into the gib and key. Experience has shown that this actually occurs, as keys and gibs which were tolerably loose at first become perfectly tight after a few weeks' use. In laying the track with these plates, the plates are firmly keyed to the rails at the proper distances apart. The ties are notched to receive the lug on bottom of tie plate and drilled for spikes to a template. The rails are placed in position and the tie raised and spiked on.

Mr. Schubert believed that by giving to the lower side of the tie the proper shape, the greatest objection to them based upon their tendency to work loose and to

grind up the ballast would be overcome. This lower side should be so shaped as to admit of being easily tamped to a uniform hardness. The bed of the tie should be firm enough to support a weight of 40 to 50 lbs. per in. The relative ease and efficiency with which wooden and iron ties are commonly tamped may be illustrated by fig. 2 and figs. 3 and 4. Fig. 2 shows the under side of a wooden tie to be reasonably close to the line of force of the blow of the pick. In figs. 3 and 4 there is a large body of ballast lying next to the under surface of the tie, which is but indirectly affected by the blow. He had several wooden ties thoroughly tamped and then carefully raised. He found that while the portions of the surface near the edges would support 110 to 140 lbs. per sq. in., the parts at the centre would only support 40 to 50 lbs. per sq. in. He also showed plaster casts made of the bed of Haarman and of Hilf ties. They were obtained by thoroughly tamping the ties, raising them carefully, taking an impression of the surface, and then making casts using these impressions as dies. An examination showed that in the case of the Haarman tie, fig. 3, only the parts at *A*, *A* were firm, while in some cases the parts at *B*, *B* were not even filled. The Hilf tie fig. 4 showed better results. The horizontal parts and at *A*, *A* were well tamped, and only narrow portions at *B*, *B* were loose. Reasoning from the fact that the ties examined showed the force of the blow to extend $3\frac{1}{2}$ to 5 in. from the edges, he concluded that a tie of 4 to 5 in. in width would have good bearing surfaces, even though made like fig. 3. When this width is exceeded, the centre part of the tie should follow lines being nearer to the line of the blow of the pick, and therefore he suggested as the best form for the under side of tie some such shape as fig. 5.

Several gentlemen present took exceptions to this form of tie on the ground that the ballast would be as easily driven out as it was in; that the wedge action of the tie would loosen the ballast and make the tie very unstable while the sharp edge in the centre would cut and grind up as much ballast as the edges of the Haarman or Hilt ties.

Mr. Heindle, of Vienna, described a system which he had operated successfully for a number of years. He used a straight iron tie, fastening the rail to it by means of a gib and key and a wedge-shaped tie plate which gave an inward tip to the rail. Great care was exercised in fitting up the fastenings, the intention being that the rail should be the only part to wear and require replacing. This track has been in use since 1883 and there has been no loosening of parts or wear of any part except the rail. The ties had remained firm, their edges were still sharp, and there had not been the slightest perceptible spreading of rails. The ties used were 7 ft. 9 in. long and weighed 160 lbs. The cost of maintenance had been less on a five-mile piece of this track than on a five-mile piece of track laid on wooden ties and subjected to the same service. A two-mile portion of this track, concerning which accurate data has been kept, has had passed over it between 1883 and 1892, inclusive, 42½ million tons or about five million tons yearly, or about 80,000 trains, including five or six fast express trains daily. Mr. Heindle knew of no track which had stood so well or needed so little repairs as this track under similarly severe service. He believed thoroughly in the use of metal ties, and believed they should be carefully constructed to bring good results.

Mr. Stambke believed that much of the trouble of iron ties working loose was due to the fact of their not being substantial enough. He advised using ties 8 ft. 9 in. long, weighing 175 lbs.

Speed Registering Attachment for Locomotives.

An apparatus known as the Hausshälter speed indicator and register has lately been tried on a number of European railroads, especially in Switzerland and Austria. A similar instrument, the chronotachytreter, has been successfully used for some years on the express locomotives of the Paris, Lyons & Mediterranean. Its object is to constantly indicate to the engineer the speed of the locomotive and to register on a paper band the speed, the stops and the distance passed over during any time. By its means it is possible to control not only the time of arrival at and departure from any place, but also the regularity of the run between stations and the movements of the locomotives in yard work. In case of accident the record is an accurate and impartial witness.

The Hausschalter instrument is attached to the side of the cab, the mechanism being enclosed in a cast iron box. The indicator consists essentially of a vertical axis, geared to one of the driving axles, and revolving according to the speed of the latter. This motion is transmitted by screw gearing to a short horizontal axis. There is a second vertical axis revolving uniformly by means of clockwork. On this axis is fitted a cylinder, revolving with it, but capable at the same time of sliding on it. To the upper part of this cylinder is attached a helix of somewhat large pitch, while the lower part is finely grooved. These groovings engage with a pinion at one end of the horizontal axis. The groovings do not extend entirely around the cylinder, but are broken in one place, forming a groove parallel to the axis. It follows from this that at each revolution of the axis, the sliding cylinder will alternately be lifted a certain distance, and then the horizontal pinion becoming disengaged will fall back to its original position, and as the times during which the cylinders engage with the pinion are uniform, the distance which the cylinders will be lifted during each revolution will be proportional to the rotation of the first vertical axis and consequently to the speed of the train itself.

The speed is indicated on a dial by a needle which is displaced according to the position of the sliding cylinder, by means of a pin, so situated that at each turn of the cylinder it is pushed upward by a flange at the top

of its grooved part if the speed is increasing, or depressed by the helix above if the speed is diminishing, while if the speed remains constant through two or more revolutions the pin remains stationary. The clockwork causes the cylinder to revolve once in 12 seconds, and a broader portion of the flange acts upon a shorter pin at the half revolution, so that a new pointing of the needle is obtained every 6 seconds. A gong attachment is so arranged that when the cylinder is lifted to a height corresponding to 5 km. per hr. less than the maximum prescribed speed one warning strike is sounded, at the maximum two strikes, and one stroke again when speed is diminished 5 km. per hr. This attachment is easily adjusted to any other conditions.

The registering is done by dots punctured on a paper roll, which is unwound at the rate of 2 mm. per minute. The roll as it is unwound is punctured at the top and bottom, every three minutes, these dots being about $\frac{1}{4}$ in. apart. The bottom line is also specially marked at every tenth point, corresponding to half-hour intervals.

The apparatus connected with the speed-indicating mechanism registers graphically by ordinates the speed in kilometres per hour, and by abscissas the distances passed over, a point indicating each quarter or half kilometre. From this sheet, which gives the whole story of the locomotive's run, it is possible to read at once the speed at any point, duration of stops and the speed in ascending or descending any grade. These instruments, which are minutely described and illustrated in the *Revue Générale des Chemins de Fer* for December, 1892, are manufactured by M. Hassler, at Berne, Switzerland.

TECHNICAL.

Manufacturing and Business.

Queen & Co., incorporated, Philadelphia, are introducing a steam engine indicator of especial merit. "The Bachelder" is a new departure from all other forms. The important feature in this indicator is the flat, adjustable spring by which the change can be made from one scale to another by a simple adjustment of the fulcrum, thus avoiding the extra expense and necessity of carrying a series of spiral springs. This house has also this year put on the market a line of steam and pressure gauges of its own make for which it claims great accuracy.

The name of the Congdon Brake Shoe Co., of Chicago, will be changed to the Sargent Company on March 21 next.

The Aerated Fuel Company, of Springfield, Mass., announces that in its suits against the Cox & Sons Co., the Woodbury Glass Co. and the Cohansey Glass Mfg. Co., Justice Acheson, in the United States Circuit Court, has rendered decrees in its favor. The suits were brought under the Bullard patent of Feb. 5, 1889, which covers all apparatus for burning hydrocarbon liquid in the presence of compressed air when the liquid and the compressed air are supplied to the burner through separate conduits, and the degree of compression of the air is automatically regulated.

The Detroit Foundry & Equipment Company have set apart rooms at 225 Dearborn street, Chicago, for a "Foundrymen's Exchange," which they hope will be the nucleus of a permanent organization similar to one now existing in Philadelphia. Papers, books and special information are being collected, and all interested in foundry work are invited to call or communicate with the Chicago office.

The Automatic Railway Track Sander Co., of Portland, Me., has been formed for the purpose of manufacturing automatic railroad track sanders. The officers are: President, C. V. Holman, Boston; Treasurer, F. H. Verrill; Clerk, E. C. Verrill; Directors, C. V. Hollman, E. C. Verrill and J. B. Moran, Boston, Mass.

The stockholders of the Washburn & Moen Manufacturing Co., at Worcester, Mass., voted this week to increase the capital stock of the company from \$2,500,000 to \$3,000,000, in order to enlarge the capacity of the new works at Waukegan, Ill.

The Laidlaw & Dunn Co., of Cincinnati, and the Gordon Pump Co., of Hamilton, have agreed on terms of consolidation. The business of the two companies hereafter will be carried on by one company, to be called the Laidlaw-Dunn-Gordon Company. The capital stock will be \$700,000, and the consolidated company will shortly begin the erection in Cincinnati or its immediate vicinity of a large new factory.

The Detroit Electrical Works, Detroit, Mich., have recently added to their machine shop two 10-ton traveling cranes and one 15-ton jib crane. These cranes were recently successfully tested with loads 50 per cent. in excess of their rated capacity. They were manufactured and erected, together with the traveling crane tracks and supports, by the Detroit Foundry Equipment Co., Detroit, Mich.

The Columbian Metallic Rod Packing Co., of Philadelphia, has opened an office in room 708 Chamber of Commerce Building, Boston, Frank McGurk in charge; also at Chicago, in room 360 Rookery building, W. Edward Maher in charge.

New Stations and Shops.

The North Shore Traction Co., of Lynn, Mass., has placed the contract for a new car shed with the Berlin Iron Bridge Co. The building will be 103 x 300 ft., constructed entirely of iron and brick in order to have the station fireproof. The same company is also making an addition to a car shed for the Wilmington City Railway Co., at Wilmington, Del.

Cranes at the World's Fair.

Of the three electric traveling cranes of 20 tons capacity each, built for the World's Fair, and which are to be used in the three bays of Machinery Hall and its Annex, the first to be installed was the traveler built by the Yale & Towne Manufacturing Company. The runways, which, in addition to the track for the traveling bridge, are also made to carry an extended line of shafting throughout the building for the transmission of power to the machinery, are a little over 21 ft. in height and extend to a length of 850 ft. in the Machinery Hall, to which must be added 551 ft. more contained in the Annex, making in all an extent of bridge travel of over 1,400 ft. For hoisting purposes the floor area covered by the two trolleys on the crane reaches the grand total of nearly 100,000 sq. ft., most of which space will be taken up by machine exhibits of one kind or another. To bring material into the building the railroad tracks have been laid in the ground to a depth sufficient to bring the floor of the car on a level with the floor of the building, so that unnecessary lifting will be avoided. Visitors to the Paris Exposition will remember the fine view obtained from the platform of the electric traveling cranes there exhibited. The three traveling cranes at the Columbian Exposition will, in similar manner, be fitted up to carry passengers, giving an excellent overhead view of all exhibits in the Machinery Hall and Annex.

The Discharge of Niagara River.

During December, 1892, Major Stickney, U. S. A., made twelve gaugings of the discharge of Niagara River, commencing on the 10th and ending on the 28th. During this time the height of water on the Buffalo gauge, the zero of which is at the mean level of Lake Erie, varied from -0.30 to -2.95, averaging -1.54, and the discharges per second varied from 161,743 cu. ft., with the gauge at -2.95, to 223,940 cu. ft. with the gauge at -0.30. The mean of all the gaugings was: 200,805 cu. ft. per second.

Electric Car Lighting in Italy.

For some time past electric lighting has been tried experimentally on the Italian Mediterranean railroad, a number of cars having been fitted up with the light with the view of determining its general efficiency. The current is furnished by Huber accumulators arranged in batteries in boxes, weighing about 110 kg. (242 lbs.) Five and ten candle-power incandescent lamps are employed, each first-class car being provided with about 40 candle-power, which can be maintained by two accumulator batteries for a period of about 30 hours. The batteries are charged at the main shops at Turin. No results of the trials appear to have yet been published.

Largest Steel Steamers on the Lakes.

The keel for the one hundredth vessel built by Messrs. F. W. Wheeler & Co. was laid at the shipyard of that company, West Bay City, Mich., March 2, the 40th birthday of Mr. Wheeler. This will be, when built, the largest steel steamer on the lakes, and will look more like an ocean freighter than a lake carrier, on account of the engines being amidships. Two sister-ships, to be built at the same yard, will be of the same dimensions, and these three will be the largest freight steamers on fresh water. The dimensions of the "Centurion," the vessel already begun, are: 378½ ft. over all, 360 ft. keel, 45 ft. beam and 26 ft. deep. The engines will be triple expansion, 23, 37½ and 63 in. by 44 in. stroke, and will give a speed of about 14 miles an hour. The boilers will be three in number and 12 ft. 6 in. in diameter by 12 ft. 6 in. long. The construction of the hull will be of ample strength to pass the rigid inspection of British Lloyds. The water bottom, 54 in. deep, will contain 1,600 tons of water when filled. The cabins will be finished in Louis XVI. style, and will compare in elegance to the cabins of an ocean liner. The "Centurion" will cost, complete, \$270,000.

The Trolley in Brooklyn.

Municipal permission for the introduction of the trolley system in Brooklyn having been obtained early in 1892 many of the street railroad companies have since been actively engaged in substituting mechanical for animal traction. Up to this time, with the exception of a short length of one-half mile operated by cable, all the street car lines were operated by horses, although several of the lines used steam dummies outside the city limits. In 1890 the Coney Island & Brooklyn Railroad Co. opened an electric line from the city line to Coney Island, a distance of six miles. As soon as possible the remainder of their system, 16 miles of single track, was equipped, the whole being in operation within six months.

The Brooklyn City Railroad Co. has relaid some 35 miles of single track of its system, the total mileage of which exceeds 200 miles of track. The work of relaying is being prosecuted with great vigor. Two of its lines, Third avenue and Court street roads, were in full operation before the beginning of this year. One power station at Fifty-second street and Second avenue is built and now developing from 2,000 to 3,000 H. P. It has a reserve capacity up to 10,000 H. P. At Kent and Division avenues the foundations for the power station to operate the lines running into the Eastern District have just been finished. Its capacity will be 15,000 H. P. A third and smaller station, the site for which has not yet been determined, will be built in the Ridgewood district. It will develop 3,000 H. P.

The Atlantic Avenue Railroad Co., now the Brooklyn

Traction Co., has relaid about 12 miles of single track. The power station is at Third avenue and Second street, South Brooklyn. Initial capacity, 2,350 H. P., with reserved capacity up to 5,000 H. P. None of these lines are yet in operation. The Brooklyn Traction Co. has recently acquired by purchase the Brooklyn, Bath & West End Railroad. The transfer from steam to electricity can be made at small cost, furnishing thus an excellent through electric service from South Ferry to Coney Island, passing through the important suburbs of Bath Beach and Bensonhurst.

The Brooklyn City & Newtown Railroad Co. has seven miles of single track in operation on De Kalb avenue. The power station at De Kalb and Central avenues exerts 1,500 H. P. This company has retained the ordinary 16 ft. car, using a trailing car in rush hours. With lighter rolling stock it is hoped to avoid as much as possible the great and rapid deterioration of track.

Chicago & South Side Rapid Transit Railroad Terminal.

Plans for increasing the facilities of the Chicago & South Side Rapid Transit Railroad at the Congress street terminus have been devised by Dr. W. T. Barnard, President of the road, and the work will be commenced at once. The changes and additions will make it possible to handle more than double the traffic at that station that can be accommodated with the present arrangement. The structure will be extended across Congress street to the building line on the north side of the street, but the trains will be stopped south of the south line. There will be only one track, as at present, but the platform on the east side will be decreased in width, and the track moved sufficiently in that direction to allow for a platform on the west side of the track. The platform on each side will be extended across Congress street to the north side of that thoroughfare where two new stairways will be provided, the one on the east for arriving passengers and that on the west for outgoing passengers. Both platforms will be extended south to Harrison street. There will be ticket offices on the west platform at Congress and Harrison streets, and arrangements may be made for intermediate entrances to the trains. It is expected that by having the arriving passengers leave the train from the south end of each car to the east platform, the outgoing passengers may begin to enter the train from the west platform through the north end of each car, nearly as soon as the south gates are thrown open for exit. With this arrangement it is expected that trains may be run from the station under a two-minute headway. It is possible that some of the trains, every third or fourth one, will be stopped at Twelfth or Eighteenth street; Twelfth street is preferred, as that is more convenient to the stations of the surface steam roads. The structure will be completed to Jackson Park by the middle of April, and the train service to the Fair grounds will be in good working condition in ample time for the opening. With the express and local service that the road expects to provide for its patrons, a block system will be necessary, and several such systems are now under consideration by the officials.

The Car Ferry Steamer "Sainte Marie."

This boat, which was lately launched by the Detroit Dry Dock Company, will run across the Straits of Mackinaw, seven miles, between St. Ignace and Mackinaw City. It will serve the Michigan Central, the Grand Rapids & Indiana and the Duluth, South Shore & Atlantic railroads. The dimensions are: Length on deck, 302 ft.; breadth, 51 ft. 6 in.; depth, 24 ft.; draft, loaded, 17 ft.; capacity, 18 loaded freight cars; speed, 15 miles an hour. The "Sainte Marie" has a 10-ft. propeller under the bow and a 12-ft. propeller in the stern. The two engines are vertical compound; forward, 20 and 52 in., with 40 in. stroke; after, 32 and 58 in., with 48 in. stroke. There are four double-ended boilers, 11 ft. 6 in. in diameter and 18 ft. long, working to 120 lbs. pressure. The two propellers in the "St. Ignace," the smaller predecessor of the "Ste. Marie," have been found very efficient in the ice which covers the Straits of Mackinaw for about five months of the year, and they have been adopted in the two Ann Arbor boats. The "Ste. Marie," which is built of wood, has been made very strong. The frames, which are 24 x 12 in., are covered by 6-in. planking, and on the sides this is covered with steel plating $\frac{1}{4}$ in. thick to prevent chafing by the ice. The bow and stern are of solid timber and covered with steel plates 2 in. thick. It is said she will run through solid ice 4 ft. thick. The cost complete is to be \$350,000.

Electric Central Stations in France.

Statistics published in *Les Annales des Travaux Publics* show that there are now in France, excepting the Department of the Seine, 209 electric central stations. Two hundred of these have a combined horse power of 1,635. In 91 of the stations steam engines are the prime movers; 86 stations use water wheels; 14 use steam engines and water wheels, together; eight are provided with gas engines; and in one of the stations power is furnished by a hot air engine. The constant current is used in 173 stations; the alternating current in 26; one station uses both on two different circuits. Eight of the constant current installations use voltages of from 55 to 70; in 70 the voltages range from 100 to 150; in 11, from 200 to 250; in six others, currents of from 325 to 930 volts are generated; two stations have 2,000-volt currents, and five others work with 3,000 volts. Of the alternating current installations one generates a 300-volt current; two have 2,000-volt currents; 15 others, 2,400-volt currents, and one works with 2,600 volts. Of the remaining seven no data are given. Among all

these only a small number prosper: a few others make both ends meet, but by far the larger proportion is losing money.

It will be noticed that this information excepts Paris, which is in the Department of the Seine.

THE SCRAP HEAP.

Notes.

The New York, New Haven & Hartford has issued an order that five red lights must be displayed on the rear end of all freight trains at night. This is to distinguish them from passenger trains, which carry three red tail-lights.

The Michigan Central has issued an order that when a passenger train is crossing the Cantilever bridge over the Niagara River, no other train shall be on the bridge. This is done to afford passengers a view of the river below.

The Philadelphia & Reading has discharged about 60 men at Bethlehem, Pa. The retrenchment is in work trains, extra track gangs, carpenters, etc. There have also been reductions in the forces on the Buffalo division and at other points.

The Hartford Board of Trade has issued a circular announcing the names of the committee who will, as in former years, represent Hartford investors at the annual meetings of prominent Western railroads. It is stated in the circular that the banks and insurance companies of Hartford hold about \$27,000,000 in railroad securities, and that many millions more are held there in private hands.

The Wilmington & Weldon road has paid the \$31,000 back taxes which have been assessed under the terms of the recent compromise with the state authorities. As recently noted in these columns, a number of North Carolina roads were by their charters exempt from taxation; but numerous branches were built, on which it is now decided that large sums are due the state because the exemption did not apply to them; the state now accepts a small percentage of these large accumulations, in consideration of the agreement of the roads to give up the exemption entirely henceforth. The amount of taxable property put on the tax lists by this compromise amounts to \$10,000,000. The charter of the Petersburg & Weldon, another road in the same situation, has been re-enacted and made perpetual, with all its property liable to taxation. The Raleigh & Gaston compromised and settled some time ago.

The movement of passengers to Washington on the occasion of the inauguration of President Cleveland, March 4, was very large, but we have seen no close estimate of the number. It is said that the larger part of the crowds came from points north and east of Washington. Both roads, the Pennsylvania and the Baltimore & Ohio, ran extra trains by the dozen. The total movement was evidently considerably smaller than that of last October, on the occasion of the Grand Army Encampment. An unusual incident, for this season of the year, in the latitude of Philadelphia, was the detention for several hours of 11 north-bound passenger trains near that city on Sunday in consequence of the foremost one getting stuck in the snow. This was at Langhorne on the Philadelphia & Reading. This snowstorm blocked many trains throughout eastern Pennsylvania.

Foreign Notes.

The proposed design for an electric elevated railroad at Berlin, Germany, frequently referred to during the past year, has, with a few minor modifications, been approved of by the special commission appointed some time ago to examine into and report upon it. The plan has now been filed in the Department of Public Works pending the final approval of the emperor; this secured, construction will probably be immediately commenced.

According to the *Polytechnisches Notizblatt*, a new, rust-proof covering, brought out in Vienna, is secured by coating the objects electrolytically with super-oxide of lead. A satisfactory coating, it is said, can be obtained within 20 minutes, and is perfectly proof against atmospheric influences. As the whole operation is conducted at ordinary temperatures, the temper of steel articles, for example, is not affected by it. It is claimed to be specially applicable to parts of small firearms and machinery.

Many of the older maps of Russia, says the *Revue Industrielle*, indicate the existence of vast tracts of marsh land in the districts watered by the Pripiet, one of the tributaries of the river Dnieper. As a matter of fact, however, these marshes have now almost entirely disappeared. Ever since 1873 the Russian government has labored at the work of properly draining them, and something like 1,000,000 hectares have been laid dry. The cost of the work from 1873 to 1891 has been nearly \$2,000,000, and the value of the land has been raised from about 1 rouble to 60 roubles and more a hectare. The fertility of the land thus regained is said to be remarkable, and has not been without the most gratifying effects on the general prosperity of the population.

The *Techniker* writes that when a steel or an iron rod is strongly magnetized it becomes longer than before, but its volume remains the same, the cross section becoming contracted. Joule found that the elongation amounted, as a maximum, to $\frac{1}{75000}$ of the original length of the rod. This phenomenon is explained by the circumstance that on magnetization of the various particles these tend to assume a position parallel to the direction of elongation. This view seems to be further borne out by the observation, made by Page, that at the instant of magnetization or demagnetization a faint, metallic sound is heard in the rod. It has further been shown that by repeatedly magnetizing and demagnetizing a piece of iron in rapid succession, it becomes heated just as though internal friction were developed by the operation. All this is looked upon as good proof of the molecular structure of iron.

According to the *Revue Scientifique*, M. Loison de Viviers has conceived the idea of constructing a heater based on the well known fact that in slaking lime a considerable amount of heat is liberated. The proposed

heater is to consist of a double-compartment cylinder, one of the compartments to contain unslaked lime and the other water. The admission of the water to the lime compartment is to be controlled by a cock on the side of the cylinder, and it is pointed out that by suitably regulating the quantity of water admitted the temperature can be maintained within certain limits. As a car heater it has been thought the apparatus would specially commend itself, notably because of the absence of gases of combustion which would tend to vitiate the atmosphere. The *Moniteur Industriel*, however, emphasizes the fact that the emptying and recharging of such an apparatus would be more or less troublesome, and particularly objectionable in cases where the apparatus would be a fixture in a car. In such cases the recharging would probably entail much damage to floor coverings and car furniture since the attendants could not be made to be sufficiently careful in handling the material.

World's Fair Notes.

Director of Works Burnham has informed the representatives of organized labor who called on him lately in reference to the recent strike of electrical workers that in the matter of wages he could deal only with the individual workers.

The Navy Department has received answers from all the governments invited to participate in the naval display. Austria, Turkey and Greece decline, no vessels being available. Germany and Russia accept. Germany will send two armored cruisers, the "Kaiserin" and "Augusta," and the cruiser "Seeadler." Russia will probably have the largest representation of any nation. The Russian fleet will include the first-class armored cruisers "Dimitri Do Skoiv" and "General Admiral" and the corvette "Rynda." Two or three other vessels will leave Cronstadt when the ice yields. They will probably be the battleship "Emperor Nicholas" and the armored cruisers "Nachimoff" and "Pamiat Azova." Great Britain has accepted, but the fleet has not been selected. The flagship "Blake" and several vessels of the North Atlantic squadron will be present, and it is probable that one or two cruisers will also be sent over. Italy will send the cruisers "Etna," "Bausan" and "Dogali" and perhaps the transport "Eridano," under Rear Admiral Magnaghi. Spain will be represented by the cruisers "Reina" and "Regente" and "Infanta Isabel," and the gunboat "Espana." France has virtually accepted the invitation to participate, but no vessels have yet been designated. Brazil will send the iron-clad "Aquidaban" and the cruisers "Republica" and "Tiradentes." From the Netherlands will come one frigate of the first class, the "Van Speyk." But where is Chili?

The "De Witt Clinton" for the World's Fair.

The New York Central will send to the World's Fair a locomotive, tender and two passenger cars made in exact imitation of the "De Witt Clinton" and the train which it hauled between Albany and Schenectady, on the Mohawk & Hudson Railroad, in August, 1831. This train is not to be a mere model. The engine will be a working machine, and the whole will be as near like the original as possible. The work is now being done at the New York Central shops in West Albany. The original of this train is the one which has been made familiar in recent years by the engraving copied from the silhouette which was taken by Mr. W. H. Brown in 1831, and this engraving has been widely published. The original silhouette was presented to the Connecticut Historical Society, Hartford.

A Fine Paper Locomotive.

An exceptionally "fine and large" specimen of the genus *Locomotiva newspaperiana* has just made its appearance. It is somewhat of an early "bloomer" and may possibly be nipped before reaching maturity by cold weather (and facts). This variety is especially distinguished from the common or garden locomotive by the exuberance of its dimensions, which prevent it being grown or run freely near ordinary tunnels or bridges. It is of course intended for exhibition at the World's Fair, and its growth is now being forced in the hothouses of Messrs. Sanctissima, Editoribilib, We & Co. in the Central Hudson district of this great country. These distinguished horticulturists have just given out the following description, which, however, unfortunately omits to state whether the stroke of the single cylinder can be shortened or not while running. It also omits to mention that the long stack has a patent universal joint, so that it can be angled in any direction and used to blow away snow drifts. Any hard packed snow or drifted sand will be doubtless removed by the large steam pipe or flues. The account states:

"It is proposed that the locomotive shall be superior in propelling power to any yet constructed. The best mechanical engineers are now at work on an engine of what is known as the Buchanan design water arch. The machine is to be much larger than the engines now used on the Empire State Express. Its cylinder will be 20 x 26 in., and it will have wheels of the same size—7 ft. 6 in.—as those of the monster No. 903, now used by the Empire State Express, Western Division. It is estimated that the new engine will maintain a speed of more than 82 miles an hour. This mammoth locomotive will have 334 three and a half inch tubes. The boiler will be of five-eighths Bessemer steel. The main steam pipe will be 16 in. in diameter, and of seamless steel tubing. The forward and back axles will be 10 in. in diameter and the smaller one 8 in. The engine when completed will stand 22 ft. 6 in. from rail to top of the stack. In length it will be 87 ft. 6 in. All woodwork will be of mahogany. The engineer's standing board will be 12 ft. 10 in. above the rails."

The Behring Strait Railroad.

The New York Sun has a dispatch from San Francisco saying that following a dinner given in New York City by Henry Clews to some capitalists, where the subject of an all-rail route to Russia happened to be introduced, a fund of \$20,000 was raised, and Robert Faulkner engaged to make a survey. One of the party, John D. Hutchinson, has returned to San Francisco, Mr. Faulkner staying at Behring Strait for the winter. The survey, which was commenced June 3, 1891, extended from Vancouver, B. C., to Cape Prince of Wales, the point of Alaska nearest to Asia, a distance of 2,346 miles, which was reached in September last. The route followed through Alaska was substantially the same as that taken by the Western Union Telegraph Company's surveyors when it was thought that the Atlantic cable would not be a success, and the route is thought feasible. Mr. Faulkner estimating the average cost at \$23,000 per mile. Mr. Hutchinson says: "Topography was taken only as far as Juneau. Up to that point we found the route a comparatively regular one. From there we proceeded on an air line, as nearly as possible paralleling the coast west of Mount Fairweather. Comparatively

easy grades can be obtained. The worst place that we found was in crossing the Alaskan range at what we called Vincent Pass. But this is not higher than Stampede Pass on the Northern Pacific."

The distance across Behring Strait is estimated by Mr. Faulkner as 26½ miles, but the distance is cut by eight islands. Across all these spaces, except two, cantilever bridges can be constructed. In those two pontoons would have to be used, for either distance is five times as great as the longest span in the Brooklyn bridge. There is no danger from large icebergs in Behring Strait, as it is so shallow that all large bergs ground before reaching the straits proper, some 40 miles north of the proposed bridge site. The road to open intercontinental traffic would have to be continued some 2,300 miles to a junction with the Siberian railroad. This would allow people who fear seasickness to visit Paris by rail, and doubtless by the time this road is opened London also, for by that time the English will have either built a bridge or given up their fear of an invasion by tunnel.

A French Railroad Wreck.

A correspondent of the London *Engineer* contributes the following account of the manner in which a wreck was dealt with on an important French line. Apparently this was an instance where they don't "manage these things better in France."

The "train de luxe," which leaves Paris, Nord, every evening at 7:30 p. m. for the Riviera, is an important train run chiefly for the benefit of the many English visitors to the sunny south, with through coaches from Calais to the shores of the Mediterranean.

On Thursday, Dec. 29, 1892, this train left Paris at 7:51. At about 8 o'clock the train was stopped by signal at one of the stations on the Belt line, and after waiting about ten minutes was run into from behind by a local train. The buffers and couplings of the last three vehicles and the sleeping car were nearly all smashed. The engine of the local train—a tank engine—had buried itself in the end of the rear van, the body of the latter being twisted off its frame some 18 in. out of the straight. The body of the next coach had also been forced forward about a foot from its position on the frame. The most natural course under the circumstances would have been to send on the front undamaged portion of the train to the next convenient station, and there make up the train afresh. So simple a course, however, did not commend itself to the French mind. The station master had, it appeared, gone off to the theatre, the train officials declared they had no authority to do anything at all, and so matters remained at a standstill. Being within ten minutes of the Paris terminus, however, some one must turn up before long, probably a breakdown gang. It seems almost incredible, but it is a fact, nevertheless, that an hour and a half passed before anything whatever was done. Not a single official put in an appearance; not a sign of a wrecking train or crew. At the end of that time a man in a blouse came along carrying a single screw-jack. A little later four or five more men in blouses carrying paraffine lamps showed up. Then ensued an interesting confabulation; there being still no one in authority the half-dozen men in blouses, the guards of the train and the engine drivers all proceeded to enunciate their ideas, and with much gesticulation to demonstrate how the thing should be done. Finally, they decided to divide the train between the sleeper and the sixth vehicle. Two out of the four buffers were smashed, the other two being interlocked. French buffers being presumably not made to stand hard knocks, a sledge hammer was produced, and one of the intelligent artisans made himself very warm trying to smash one of the interlocked buffers. Eventually the train was divided, the front portion going on to the P. L. M. terminus in Paris, where the train was made up afresh. At 11:40 p. m., three hours fifty minutes behind time, the train "de luxe" stole out into the night, and once more started on its long journey southward.

But where on that eventful night were the responsible officials? Where was the traffic superintendent, the permanent way inspector, or even the station-master? If such things happen within a few minutes of the Paris terminus, what would be the fate of the injured in a serious accident, occurring perhaps some hundreds of miles away? It would be interesting to know how long those half-dozen talkative individuals with the single screw-jack took getting the four damaged coaches put straight; it is not improbable they may be at it still.

The 1893 Version of the Same Old Story.

Over in Arkansas last summer the superintendent of a certain railroad was going over the road one day when he saw what he took to be a dead bull, and telegraphed the section foreman to bury the bull that had been killed by the cars. The next morning he received the following telegram:

The bull that the train killed was not killed by the train. She died from eating buckeyes and ain't dead yet. Will bury him to-morrow. Answer at once if I shall skinned her.

—Salt Lake Tribune.

LOCOMOTIVE BUILDING.

The Missouri Pacific is reported in the market for 50 locomotives.

The New York, Lake Erie & Western has placed an order this week with the Baldwin Locomotive Works for 50 engines. Ten of these will be compounds.

The Dickson Mfg. Co., of Scranton, Pa., has received an order from the New York, Ontario & Western for building 10 consolidation engines.

The Ohio Southern has awarded a contract to the Baldwin Locomotive Works for building eight moguls, two eight-wheel passenger engines and two six-wheel switchers.

CAR BUILDING.

The Maine Central will shortly order two new baggage cars.

The Ohio & Mississippi has ordered 800 freight cars from the Pullman Palace Car Co.

Murray, Dougall & Co., of Milton, Pa., have an order for 525 cars for the Pennsylvania Railroad.

The New York Central & Hudson River is asking bids for 1,000 box, 100 stock and 100 ballast cars.

The Central of New Jersey is reported in the market for 1,500 freight cars, and the Boston & Albany for over 500, but this latter report is not confirmed.

The Pittsburgh, Shenango & Lake Erie has awarded contracts to the Ohio Falls Car Co. and to the Pullman Palace Car Co. for building 500 box cars each.

The New York, Ontario & Western has this week given out an order for 500 gondola coal cars, of 30 tons capacity, to the Michigan-Penninsular Car Company, for delivery in April and May.

The Jackson & Sharp Car Co., of Wilmington, Del., is reported to have the order for the second 50 passenger cars for the Lake Street Elevated road of Chicago. The Gilbert Car Co. has the contract for 50 of these cars, as reported last week.

The Madison Car Company, Madison, Ill., has closed contracts for the following cars: Five hundred for the Denver & Rio Grande (450 box and 50 stock); 800 box for the St. Louis, Chicago & St. Paul; 250 gondola for the Pennsylvania lines west of Pittsburgh.

BRIDGE BUILDING.

Albany, N. Y.—The following bills have been signed by Governor Flower: Appropriating \$1,500 for the removal of an iron bridge from North Salina street, Syracuse, to Sycamore street, Liverpool, and appropriating \$4,000 for constructing an iron bridge at Nichols street, De Witt.

Ashtabula, O.—Action has been begun against the Lake Shore & Michigan Southern by the people of Ashtabula to compel the company to replace a pile bridge at that point with a drawbridge. The matter has been contested before, but the decisions have been against the city.

Brookline, Mass.—The State Railroad Commissioners will give a hearing on March 8 on the petition of the selectmen of Brookline for leave to construct a bridge over the Boston & Albany Railroad at Chestnut Hill avenue at a height less than 18 ft. above the tracks.

Carthage, N. Y.—A bill was introduced by Assemblyman Fuller last week at Albany appropriating \$10,000 for a bridge across Black River at Carthage. It is claimed, however, that the amount is too small to rebuild the bridge.

Chicago.—A charter for the Chicago Bridge Co. has been filed in Illinois. The capital stock is \$10,000. The incorporators are Henry D. Bristol, Horace E. Henwood and George H. Wheelock.

Cleveland, O.—The bill to authorize Cuyahoga County to issue \$300,000 in bonds for bridge purposes is reported to have passed the Ohio Legislature. The proceeds of the bonds will be used for the rebuilding of the Columbus street bridge, which is in a dangerous condition, and also for rebuilding the present high wooden bridge connecting Brooklyn and Brighton, suburbs of the city.

Duluth, Minn.—There will be no bridge connecting Duluth and West Superior until the next session of Congress. The citizens of the two cities were divided in opinion as to whether this bridge should be from Minnesota Point to Connor's Point or from Grassy Point to the east shore of St. Louis Bay. The consequence has been that Congress failed to pass a bill authorizing a bridge at either location.

Holyoke, Mass.—Wilson Whittlesey, a real estate dealer, has applied to the state legislature for the authority to build a bridge across the Connecticut River near Holyoke, at his own expense. The proposed bridge is to be midway between the South Hadley and Williamsette bridges.

Kearney, N. J.—The joint committee appointed by the Freeholders of Hudson and Essex Counties for repairing the drawbridge over the Passaic River at Kearney have received the appended bids for the work: D. E. Olds, \$3,475; Ross & Sanford, \$5,950; N. V. Sloat & Brother, \$3,450; Bidgen & Co., \$5,880; Sanford & Stillman, \$5,220. The contract will be awarded to Messrs. Sanford & Stillman. It will require about 70,000 ft. of yellow pine timber and 40 white oak piles to do the work.

Middletown, Conn.—O. V. Coffin, of Middletown; Charles J. Cole, of Hartford; Charles M. Jarvis and Burr Field, of East Berlin, Conn., the incorporators of a proposed highway bridge across the Connecticut River from Middletown to Portland, made application at Hartford last week for authority to erect the structure. The project is opposed by one of the river steamboat lines.

Millington, N. J.—The Passaic Rolling Mill Co. has just completed a lattice girder bridge across the Passaic River at Millington, N. J., for the Delaware, Lackawanna & Western. The bridge is 300 ft. long and cost about \$16,000.

New York City.—Bids will be received by the Department of Public Works, New York, until March 28, for the construction of the bridge over the Harlem Ship Canal at Kingsbridge, New York City, to which we referred in our issue of Feb. 17. There is one draw span, 270-ft. long, one 100-ft. deck lattice span at each end, and earth embankments leading up to the bridge. The foundations for the two abutments, the two draw rest twin piers and the pivot pier are partly pneumatic and partly built either inside of a coffer dam or directly on the exposed rock bottom of the government ship canal. The canal is dry at present, there being a dam at each end, and water will not be admitted into it before the completion of the bridge. The bridge has an asphalted roadway of 38 ft. and two asphalted sidewalks of 7 ft. each. The estimate of quantities contains 2,100 cu. yds. of pneumatic work, 7,340 cu. yds. of masonry, 1,636,000 lbs. of metal and 110,000 cu. yds. of earth filling. The work is to be completed within 240 working days. Prof. William H. Burr is the Consulting Engineer.

The New York Central & Hudson River has awarded the contract for the Harlem River drawbridge to the King Bridge Co., of Cleveland, O. It will be a four-track draw, and one of the heaviest bridges of its kind in the world, if not the heaviest.

Pittsburgh.—A charter for the Lawrenceville Bridge Company, of Pittsburgh, was granted in Pennsylvania last week, the capital stock being \$25,000.

Rock Island, Wash.—The Elder Moor Bridge Works are at work erecting the superstructure of the Great Northern bridge across the Columbia River at Rock Island.

Sioux City, Ia.—There are now 250 men at work on the two piers for the Pacific Short Line bridge. The bridge will be 60 ft. wide with the railroad track in the centre and roadway and footpaths on either side. Sooy Smith & Co. are the contractors for the sub-structure and the Phoenix Bridge Co., of Phoenixville, Pa., for the superstructure. The bridge is to be completed this year and the total cost will be over \$1,000,000.

Of the five deep piers one is completed, and caissons for two of the others are halfway down, the full depth being about 100 ft. Messrs. Sooy Smith & Co., Mills Building, New York City, have this work in charge and are pushing it to an early completion.

Stratford, Conn.—The County Commissioners of New Haven and Fairfield County have received notice from the United States War Department that they must build a larger and higher drawbridge over the Housatonic River at Stratford by Dec. 1 next. Such a bridge will cost \$75,000.

Titusville, Pa.—The Western New York & Pennsylvania has begun the erection of a new iron bridge across Oil Creek at Titusville to replace the present wooden structure. It will be a two-span structure, and, including abutments, it is estimated to cost about \$20,000. The Pencoyd Bridge Co. is building it. The same company has a contract for 12 bridges along the various divisions of the road, to be built during the summer.

Wharton, Tex.—The Wharton County Commissioners' Court, in special session, has decided to defer the question of the erection of a bridge across the Colorado River until the August term.

RAILROAD LAW—NOTES OF DECISIONS.

Carriage of Goods and Injuries to Property.

The Federal Court rules that the third section of the Interstate Commerce Act, making it unlawful for any common carrier to give "any undue or unreasonable preference" to any person, company, etc., or locality, or particular description of traffic, and providing that such carriers shall "afford all reasonable, proper and equal facilities for the interchange of traffic between their respective lines, and for receiving, forwarding and delivering passengers and property to and from their several lines and those connecting therewith, and shall not discriminate in their rates and charges between such connecting lines; but this shall not be construed as requiring any such common carrier to give the use of its tracks or terminal facilities to another carrier engaged in like business," does not require a railroad company to receive freight in the cars in which it is tendered by a connecting line, and transport it in such cars, paying car-mileage therefor, when it has cars of its own available and the freight would not be injured by transfer.¹

In the same case it is laid down that in the absence of any regulation by law or custom, a road receiving freight from a connecting line is not required to advance or assume payment of the charges due thereon for transportation from the point of origin to the point of connection. And there is no obligation on the part of either to honor passenger tickets issued by the other.²

In Georgia the Supreme Court rules that a railroad which, in violation of its general and uniform usage, fails to give notice of the arrival of goods, or who wrongfully detains them after they have been applied for by a consignee ready to receive them, is guilty of such negligence, in exposing the goods to loss or damage by a subsequent fire occurring while they are in store in his depot and before giving any notice of their arrival, as to deprive him of the excuse that the loss was by the act of God.³

In Nebraska the Supreme Court holds that where goods are received by a carrier for transportation and a through bill of lading given, the shipper may elect to sue it for the negligence of a connecting carrier.⁴

In Georgia the Supreme Court rules that a railroad is liable for injury to property caused by the negligent setting out of fire in pine woods where the ground is covered with combustible materials, and the fire burns continuously from the point where it is set out to the property in question, and the spread of it is not occasioned by any intervening cause, although such property is two miles or more from the place where the fire originates, and a high wind, unless shown to be extraordinary, by which the fire is facilitated in passing from one side to the other of roads traversing the district, is not such an intervening cause.⁵

A Michigan statute provides that a purchaser of railroad property and franchises shall hold them subject to all the duties and obligations prescribed by the general laws. Another acquires a railroad constructing its road across a highway to restore the highway "to its former state, as near as may be." The Supreme Court holds that a company which acquired the property and franchises of the company which constructed the road was liable for the failure of its grantor to restore a highway crossed by the road to its former state, and that this liability was not affected by the fact that the township did work at this point in order to make the highway passable.⁶

The Iowa Code provides that "Any corporation operating a railway shall be liable for all damages by fire that is set out or caused by operating any such railway," and that a common carrier cannot exempt itself from liability as such carrier by contract. The Supreme Court rules that a contract between the owner and operator of an elevator, coalshed and corncribs, and a railroad company, exempting such company from liability for damages by fire negligently set by its engines, is void where it appears that such buildings were built and used for the purpose of promoting the business of the railroad.⁷

The Supreme Court of California holds that when a company violates a bond to construct a fence along its railroad through plaintiff's land, plaintiff need not construct the fences before bringing an action on the bond. And in such an action it need not be alleged or proved that the fences agreed to be built are necessary.⁸

Injuries to Passengers, Employees and Strangers.

In Georgia the plaintiff testified that he paid the conductor the fare, and asked to be put off at a certain station, and that the conductor said he would stop there. That the train stopped 200 yards before reaching the station, but plaintiff did not get off there, supposing it would stop when it reached the platform. That on the train's passing the platform plaintiff went to the conductor, and said he wanted to get off; that the conductor said: "God damn you, why didn't you get off when the train stopped? . . . Get off here." That the train was running 15 miles an hour, and he asked the conductor to stop it, but that the conductor said, "God damn you, get off here," and pushed him off. In the fall plaintiff was injured. Another witness corroborated plaintiff. Defendant's conductor, brakeman and a passenger contradicted plaintiff, and testified that he jumped off of his own accord. The Supreme Court holds the railroad liable.⁹

The Supreme Court of Texas rules that in an action for an injury by a passenger, caused by a car jumping the track, where the issue is whether plaintiff was injured at all, and the physicians disagree, evidence that the conductor of the train who was in a seat near plain-

tiff at the time of the accident, was not injured, is admissible.¹⁰

In Florida the Supreme Court rules that a passenger who, knowing of a rule forbidding him to ride in any other than passenger cars, rode in an express car, and received injuries which he would not have sustained had he been in any other car, was guilty of contributory negligence, regardless of the knowledge of the conductor that he occupied such position and his failure to warn him of his danger or to enforce the rule.¹¹

In Georgia a flagman opened the water closet door of a car, the fingers of a passenger, who was standing near by, slipped into the crevice of the door near the hinge, and, the flagman suddenly shutting the door, they were crushed. The Supreme Court holds that the injury was accidental, and there was no presumption of negligence.¹²

In the Federal Court it is laid down that a sleeping car company is bound to use reasonable care to protect only so much money carried by a passenger as is necessary and appropriate, in view of his circumstances and condition in life, for his wants and comforts during his contemplated journey, and is not liable if a sum of money carried for another purpose is stolen from him through the negligence of its servants, provided no special circumstances exist which impose on it a peculiar duty with reference to such money.¹³

In Georgia the Supreme Court rules that where an engineer is warned by a danger signal not to proceed with his train, and immediately thereafter another signal is given which indicates that he may proceed with safety, but both signals are continuously displayed together, leaving it in doubt which signal should be regarded, he is negligent in going on, and the company is not liable for injuries received in a resulting collision.¹⁴

The Federal Court rules that the negligence of a fellow servant will not excuse the master from liability to a co-servant for an injury which would not have happened had proper machinery been furnished.¹⁵

In Indiana the Supreme Court holds that a member of one section gang and the boss of another section gang employed by the same railroad company are fellow servants.¹⁶

In New York it is ruled that the rate of speed at which a railroad company operates its trains may constitute negligence, and whether there was such negligence in a given case is a question for a jury.¹⁷

And in Indiana that whether it is negligence to detach cars from a train, and send them along the track, and over a highway crossing, without an engine attached, is generally a question for the jury.¹⁸

In Kentucky it appeared that deceased was struck by a freight train running at the rate of 15 miles an hour, while he was sitting on the track with his face in his hands; that he was a trespasser; that the train could have been stopped in a distance of 400 to 500 ft., and that both the engineer and conductor apprehended, when they first saw deceased, that he would not get off the track. There was evidence that deceased was discovered by them when the train was at points varying in distance from 402 to 1,257 ft. from deceased; that the alarm was at once given, and an effort made to stop the train. The Court of Appeals reverses a judgment in favor of the railroad.¹⁹

In Kentucky it is held by the Supreme Court that failure to give warning of the approach of a backing engine in a railroad yard, or to have a person in position to see the track ahead of it, is not such negligence as will render the company liable to a trespasser in the yard for an injury caused by being run over by such engine; and the fact that such trespasser is an infant does not affect the legal rights of the company, because signals of approaching engines must be given, and oversight of the tracks exercised, uniformly and habitually, or not at all, and for the protection and safety of all persons or none.²⁰

¹ O. S. L. & U. N. v. Nor. Pac., 51 Fed. Rep., 465.

² O. S. L. & U. N. v. Nor. Pac., 51 Fed. Rep., 435.

³ R. & D. R. Co. v. White, 15 S. E. Rep., 802.

⁴ M. Pac. R. Co. v. Twiss, 53 N. W. Rep., 76.

⁵ East Tenn. V. & G. R. Co. v. Hesters (Ga.), 15 S. E., 828.

⁶ Thayer v. Flint & P. M. R. Co., 53 N. W. Rep., 216.

⁷ Griswold v. Ill. Cent. R. Co., 53 N. W. Rep., 295.

⁸ Farley v. Moran (Cal.), 31 Pac. Rep., 158.

⁹ E. T. V. & G. R. Co. v. Smith, 15 S. E. Rep., 621.

¹⁰ Levy vs. Campbell, 20 S. W. Rep., 162.

¹¹ Fla. S. Ry. Co. vs. Hirst, 11 South. Rep., 506.

¹² Murphy v. A. & W. P. R. Co., 15 S. E. Rep., 774.

¹³ Barrott v. P. P. Car Co., 51 Fed. Rep., 796.

¹⁴ Devine v. S. F. & W. Ry. Co., 15 S. E. Rep., 781.

¹⁵ Nor. Pac. R. Co. v. Charles, 51 Fed. Rep., 562.

¹⁶ Clarke v. Penn. Co., 31 N. E. Rep., 808.

¹⁷ Miller v. N. Y. C. & H. R., 20 N. Y. S., 163.

¹⁸ Ohio & M. Ry. Co. v. McDonald, 31 N. E. Rep., 836.

¹⁹ Wren v. L. St. L. & T. R. Co., 20 S. W. Rep., 215.

²⁰ McDermott v. Kentucky Cent. Ry. Co., 20 S. W. Rep., 380.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Boston & Albany, quarterly, \$2 per share, payable March 31.

Chicago & Eastern Illinois, quarterly, 1½ per cent. on the preferred stock, payable April 1.

Cleveland, Cincinnati, Chicago & St. Louis, quarterly, 1½ per cent. on the preferred stock, payable April 1.

New York & Harlem, semi-annual, 2½ per cent. on the common and preferred stock, payable April 1.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Brookfield & Northern, annual, Brookfield, Mo., March 18.

Chicago & Alton, annual, Chicago, Ill., April 3.

Cleveland, Canton & Southern, special, Canton, O., March 29.

Elmira, Cortland & Northern, annual, New York City, March 14.

Joliet & Chicago, annual, Chicago, April 3.

Malone & St. Lawrence, annual, New York City, March 14.

Missouri Pacific, annual, New York City, March 14.

Mohawk & Adirondack, annual, New York City, March 14.

New York & New England, annual, Boston, Mass., March 15.

Northern Pacific, special, New York City, April 20.

Oregon, Short Line & Utah Northern, annual, Salt Lake City, Utah, March 15.

Pittsburg, Cincinnati, Chicago & St. Louis, annual, Pittsburg, Pa., April 11.

St. Louis, Iron Mountain & Southern, annual, New York City, March 14.

Texas & Pacific, annual, New York City, March 15.

Tennessee Coal, Iron & Railroad Co., biennial, Tracy City, Tenn., April 4.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The American Association of General Passenger and Ticket Agents will hold its annual meeting at Cumberland Gap Park, Tennessee, March 21.

The New England Railroad Club meets at the United States Hotel, Boston, Mass., on the second Wednesday of each alternate month, commencing January.

The Western Railway Club meets at the rooms of the Central Traffic Association in the Rookery Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The New York Railroad Club meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 7:30 p. m.

The Central Railway Club will meet at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of March.

The Northwest Railroad Club meets at the St. Paul Union Station, on the first Saturday of each month, except during June, July and August, at 7:30 p. m.

The Northwestern Track and Bridge Association meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The American Society of Civil Engineers meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month.

The Boston Society of Civil Engineers meets at Wesleyan Hall, Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The Western Society of Engineers meets at 78 La Salle street, Chicago, on the first Wednesday in each month, at 8 p. m.

The Engineers' Club of St. Louis meets in the Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The Engineers' Club of Philadelphia meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The Engineers' Society of Western Pennsylvania meets at its rooms in the Thaw Mansion, Fifth street, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The Civil Engineers' Club of Cleveland meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The Engineers' Club of Cincinnati meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 8 p. m.

The Engineers' Club of Kansas City meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The Engineering Association of the South meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The Denver Society of Civil Engineers meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The Civil Engineers' Society of St. Paul meets at St. Paul, Minn., on the first Monday in each month.

The Montana Society of Civil Engineers meets at Helena, Mont., on the third Saturday in each month, at 7:30 p. m.

The Engineers' Club of Minneapolis meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The Canadian Society of Civil Engineers meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday except during the months of June, July, August and September.

The Technical Society of the Pacific Coast meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The Tacoma Society of Civil Engineers and Architects meets in its rooms, 201 Washington Building, Tacoma, Wash., on the third Friday in each month.

The Association of Engineers of Virginia holds informal meetings the third Wednesday of each month, from September to May inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The Civil Engineers' Association of Kansas meets at Wichita, Kan., on the second Wednesday of each month, at 7:30 p. m.

The American Society of Swedish Engineers meets at the clubhouse, 250 Union street, Brooklyn, N. Y., and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

Association of American Railway Accounting Officers.

The fifth annual meeting of the association will be held at the Auditorium Hotel, Chicago, Ill., commencing Wednesday, May 31, 1893, at 10 o'clock a. m. Reports will be read from the standing committees, and from the special committees on Claims and Express Settlements. An address will be delivered by H. M. Kochersperger, Comptroller, New York, New Haven & Hartford Railroad, on "Station Accounts; their Organization, Management and Examination." Election of officers and for four members of the Executive Committee will be held.

Boston Society of Civil Engineers.

A regular meeting was held at the Society's room, Wednesday evening, Feb. 15, 1893, President Henry Manley in the chair and over 100 members and visitors present. Roland N. Cutter, Winchester, Mass.; Frank B. French, Woburn, Mass.; Franklin B. Locke, Boston, and Edwin A. Taylor, Worcester, Mass., were elected members of the Society.

Announcement was made of the death of Joseph Coulson, a member of the Society, which occurred at Savannah, Ga., Jan. 22, 1893, and a committee was appointed to prepare a memoir.

The Secretary read a communication from Mr. C. J. H. Woodbury, transmitting a copy of a paper read before the American Society of Mechanical Engineers by H. F. J. Porter, referring to the status of the engineering profession. The communication was referred to the Board of Government.

Mr. William E. McClintock was then introduced, and gave a very interesting account of the work of the Massachusetts Highway Commission. At the conclusion of his talk a large number of views were thrown on the screen illustrating the condition of the roads throughout the state. Mr. E. W. Howe showed by lantern views the kind of roads built in the Boston Parks, and Mr. E. F. Foss, of the Massachusetts Institute of Technology, gave some very interesting views of streets in Chicago

and Buffalo. A general discussion followed on road construction, in which Messrs. Allen, Cutter, Howe, Locke and McClintock took part.

At the annual meeting to be held March 15 it is proposed to have a series of short addresses, by members, on the relations of the engineer to those with whom he comes in professional contact.

Engineers' Society of Western Pennsylvania.

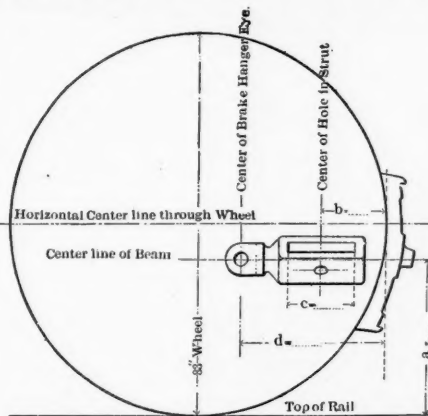
The regular meeting was held on Feb. 21, the President, Mr. M. J. Becker, in the chair, 29 members present. On motion, three members were appointed as a Committee to confer with a Committee appointed by the Chamber of Commerce in regard to a conference on entertaining visiting engineers passing through Pittsburgh en route to the World's Fair. The members of the Committee are Walter E. Koch, W. L. Scaife, John A. Brashear. Mr. Charles E. Nichols then read a paper on "The Howe Truss Bridge." After discussion the meeting adjourned.

The Chemical Section met on Feb. 23, J. H. Eastwick, Chairman; James O. Handy, Secretary; 34 members present. The following communications were presented: "The Apparent Weathering of Pig Iron," by Dr. A. B. Harrison; "Properties of Very Pure Iron," by Charles J. Pedder; "Solubility of Barium Sulphate in Acid Chloride of Iron Solution," by Dr. Charles B. Dudley; Addresses, "The Segregation of Impurities in Steel," by Walter E. Koch. Papers, "The Use of Bone Black in Domestic Water Filters," by R. Neilson Clark, M. E.

Master Car Builders' Association.

The Committee on Drawbars and Brakebeams, composed of Messrs. E. D. Nelson (Superintendent Motive Power, Pennsylvania, Williamsport, Pa., Chairman), J. H. Rankin (Philadelphia & Reading), J. Bean (Cleveland & Canton) and C. A. Schroyer (Chicago & Northwestern) have just issued the following circular, asking that replies be sent to the Chairman not later than March 20, 1893. Replies from all members of the Association are earnestly solicited:

1. What is the height of drawbars and couplers on your new freight cars, from top of rail to centre line of drawbar or coupler, when car is empty?
2. How many freight cars have you now in service with drawbars or couplers of this height?
3. Can this height be decreased to a standard which may be recommended by this committee?
4. If so, by how many inches?
5. Can you increase this height?
6. If so, by how many inches?
7. How many of your cars were built with drawbars or couplers of a different height from that given in answer to Question 1?



Please fill in the dimensions "a," "b," "c" and "d" on accompanying diagram, which shows in outline the Christie brakeshoe, the slot in strut of iron brakebeam and brakehanger eye. If you are using an iron brakebeam made at your own shops, please give all the dimensions as shown, stating the necessary facts in answer to Questions 9 and 10 following. If you are using more than one kind of brakebeam, please fill in one blank for each beam.

8. Are you using the Christie brakeshoe with an iron brakebeam on freight cars?
9. If so, please state the name by which the beam is known on the market.
10. State name of manufacturer.
11. State distance from centre to centre of brakeheads.
12. State size of brakehanger eye.
13. What have you adopted as angle of lever with vertical, the M. C. B. standard being 40 deg.
14. Do you use inside hung or outside hung brakes with beam described?
15. How much can you increase dimension "a" as given?
16. How much can you decrease dimension "a" as given?
17. How many cars have you equipped with brakebeam described?

PERSONAL.

—Mr. Edward G. Gilbert, President of the Gilbert Car Manufacturing Co., died suddenly March 7 at his home in Troy, N. Y., aged 46 years.

—Mr. Charles S. Jones, Superintendent of Telegraph on the Northern and Western lines of the Illinois Central, died at Chicago last week.

—The Governor of South Dakota has appointed J. R. Brennan, of Rapid City; H. C. Warner, of Sanborn County, and E. F. Conklin, of Clark, State Railroad Commissioners.

—Mr. S. H. H. Clark is quoted in a recent newspaper interview that he has decided to return to the Missouri Pacific at the request of the directors. He will probably resign as President of the Union Pacific about April 1, and will be elected President of the Missouri Pacific.

—Mr. William C. Bullitt has been elected Vice-President of the Norfolk & Western Railroad, vice Mr. Charles G. Eddy, recently appointed Second Vice-President of the Philadelphia & Reading. Mr. Bullitt has been connected with the company for ten years as Assistant to the President.

—Mr. George G. Stone died at Englewood, Ill., March 4, aged 28 years. He was graduated at the Massachu-

setts Institute of Technology, and until a few weeks ago had been in the employ of the Illinois Steel Co. At the time of his death he was Superintendent of the steel mill of the Congdon Shoe Brake Co.

—Judge J. D. Springer, Third Vice-President of the Atchison Topeka & Santa Fe, has resigned, his resignation to take effect April 1. He will become General Counsel of the Chicago Elevated Terminal Railroad. Mr. Springer became connected with the Atchison road soon after the election of the late Mr. Allen Manvel as President, first as Assistant to him, then as Third Vice-President, his duties referring chiefly to legal matters.

—Major S. K. Hooper, General Passenger and Ticket Agent of the Denver & Rio Grande, last week celebrated his twenty-fifth anniversary as a general passenger agent. He was appointed to that position in 1868 on the Louisville, New Albany & Chicago, and he later held the office on several other railroads, and nine years ago he entered the service of the Denver & Rio Grande.

—Mr. Thomas F. Whittlesey, who has been Superintendent of the Michigan Division of the Lake Shore & Michigan Southern for the past seven years, has accepted the position of General Superintendent of the Toledo & Ohio Central lines. Mr. Whittlesey succeeds Mr. Thomas Peeler, who has been granted an indefinite leave of absence on account of sickness.

—Mr. George H. Burrows, for many years Superintendent of the Western Division of the New York Central & Hudson River road, has been obliged to relinquish his duties on account of failing health. Mr. Burrows tendered his resignation, but the directors refused to accept it and gave him a year's leave of absence. Mr. Burrows is now 71 years old and has been Division Superintendent of the road since 1873.

—Mr. Thomas Tait, who has been General Superintendent of the Ontario & Quebec Division of the Canadian Pacific for the last two years, has been appointed Assistant General Manager, and his headquarters removed from Toronto to Montreal. Mr. Tait was formerly Assistant Superintendent on one of the Western divisions of the Canadian Pacific, and has been connected with that company for over 10 years, entering its service as Secretary to Vice-President Shaughnessy.

—Mr. C. H. Kendrick, who was General Ticket Agent of the New York Central from 1852 to 1887, died at Elkhart, Ind., on the night of March 3, at the age of 70. Mr. Kendrick was born in Nashua, N. H., and his first railroad service was on the Nashua & Lowell. Before the consolidation of the New York Central and the Hudson River he was on the latter. From 1860 to 1877 he was General Passenger Agent in addition to his other duties. After 1877 his title was Auditor of Ticket Accounts.

—Mr. Walter G. Graham, until recently General Passenger and Ticket Agent of the Missouri, Kansas & Texas system, died of consumption last week at St. Louis. He was aged 33 years. Mr. Graham was Chief Rate Clerk on the Missouri Pacific in 1888 and was afterward Chief Clerk in the Passenger Department of the Missouri, Kansas & Texas. He was promoted to the position of Assistant General Passenger Agent in September, 1889, and Acting General Passenger Agent on Mr. Meslier's resignation to accept a similar position with the Texas & Pacific, Feb. 1, 1892. Mr. Graham was General Passenger and Ticket Agent of the road until his resignation, Sept. 15, 1892, on account of ill health.

—Mr. Daniel B. Robinson, the new First Vice-President of the Atchison, Topeka & Chicago, was formerly General Manager of the Atlantic & Pacific and other roads controlled by the Atchison. He has been in railroad service since 1866, and has served in nearly every department. When 20 years old he was a freight clerk on the Central Vermont and then went to Sacramento for the Central Pacific. He was connected with the New Orleans & Mobile for 10 years, becoming General Superintendent and resigning in 1880 to become General Manager of the Sonora road in Mexico. Two years later he became General Northern Superintendent of the Mexican Central and then General Manager in 1885. He was General Manager of the Atlantic & Pacific from 1885 up to 1891, except a short period, when he served in a similar capacity on the Colorado Midland. Last year he became President of the San Antonio & Aransas Pass and also of the Santa Fe, Prescott & Phoenix, but resigned the former position in December last.

—Mr. Joseph W. Reinhart was elected a director and President of the Atchison, Topeka & Santa Fe at a meeting of the directors in Boston on Feb. 28. Mr. Reinhart is reported to be about 41 years old. He entered the service of the company in 1887 as Auditor, and has been First Vice-President for the last few years. He is generally believed to have been the originator of the plan of reorganization of the railroad and he has been the financial executive officer of the company since that time. He has been in the railroad service about 24 years, serving in the operating and financial departments in various capacities. He was born in Pittsburgh, and his first railroad work was as clerk in the Superintendent's office on the Allegheny Valley Railroad, and he became head of the auditing department of that line. He was afterward Auditor of the Richmond & Allegheny road, the James River Canal Co., and the Richmond Dock Co. He was appointed General Auditor of the West Shore before that road was placed in the hands of a receiver, and he continued in that capacity until the transfer to the New York Central & Hudson River. Subsequently he opened an office as an expert railroad accountant, and was General Auditor of the New York & Northern, when he became General Auditor of the Atchison five years ago, under the administration of President Strong. After the reorganization his title was made First Vice-President and General Auditor.

—Mr. F. D. Casanave has been appointed General Superintendent of Motive Power of the Pennsylvania road, with headquarters at Altoona, succeeding Mr. Theodore N. Ely, recently promoted to be Chief of Motive Power. Mr. George L. Potter, Master Mechanic at the Fort Wayne shops, succeeds Mr. Casanave as Superintendent of Motive Power of the Northwest System of the Pennsylvania lines, a position which Mr. Casanave has held since November, 1887. Mr. Casanave's railroad career dates back to 1862, when he entered the Altoona shops as apprentice. He acted as inspector of locomotives for the Company at the Baldwin Locomotive Works from December, 1875, until May, 1876. From May until November Mr. Casanave devoted his time to special work in the motive power department, and was appointed Assistant Master Mechanic of the Altoona shops in 1876 and held this post until December, 1881, when he was promoted to Master Mechanic of the Pennsylvania Company's Fort Wayne shops. In October, 1887, he was

appointed Superintendent of Motive Power of the Pennsylvania Company's lines west of Pittsburgh Northwest System. He is a man of very unusual ability not only technically but as a business man and administrator. Under his administration the piecework system has been developed with great success at the Fort Wayne shops, and his industry, judgment and ability as Chairman of the Arbitration Committee of the M. C. B. Association have added much to the dignity and influence of that body.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—Joseph W. Reinhart has been elected President of this company. He will have general control and direction of the operations of the company in all departments, and will administer its affairs under the direction of the Board. The principal office and address of the President will be Boston.

Daniel B. Robinson has been elected First Vice-President of this company, with office at Monadnock Building, Chicago. Mr. W. K. Gillett has been elected General Auditor, with office at Chicago, vice J. W. Reinbart, promoted. W. A. Burroughs has been elected Assistant General Auditor, with office at Boston, vice W. K. Gillett, promoted, and J. F. H. McKibben has been elected Auditor, with office at Topeka, Kan.

H. C. Ives has been appointed Purchasing Agent, vice W. G. Tuller, with office in Monadnock Building, Chicago.

Canadian Pacific.—Thomas Tait has been appointed Assistant General Manager, with office at Montreal, Que.

Cape Fear & Yadkin Valley.—L. T. Bristow has been appointed Assistant Secretary, with office at Greensboro, N. C., vice W. H. MacFarland.

Central Pennsylvania & Western.—The following officers were elected last week for this new Pennsylvania company: President, R. T. McCabe, of New York; Vice-President, E. R. Payne, of Williamsport. Directors, Wilburforce Sully, of New York; Gardner Van Orstrand, of New York; N. N. Betts, of Philadelphia; D. H. Hastings, of Bellefonte; E. R. Payne, of Williamsport, and Morgan Livenwright, of Philadelphia.

Chicago, Burlington & Quincy.—H. R. Todd has been appointed General Agent, with office at St. Louis, Mo., vice Wm. Gray. A. T. Perkins has been appointed General Agent at Hannibal, Mo., vice G. R. Buttles. W. F. McMillan has been appointed General Agent at Salt Lake City, Utah, vice E. E. Walker.

Chicago, Fort Madison & Des Moines.—John C. MacKinnon has been appointed General Freight and Passenger Agent. His office is at Fort Madison, Ia.

Chicago Great Western.—C. B. Dean has been appointed Passenger Agent, with office at No. 343 Broadway, New York, vice J. D. Levy. R. C. Stevens, previously Michigan passenger agent, has been appointed General Western Passenger Agent, with office at No. 10 Exchange Building, Kansas City, Mo., vice W. H. Gowenlock.

Duluth, Mesaba & Northern.—G. C. Gilfillan, formerly Assistant General Passenger Agent of the St. Paul & Duluth, has been appointed General Freight and Passenger Agent of this road with office at Duluth.

G. C. Gilfillan has been appointed General Freight and Passenger Agent, with headquarters at Duluth, Minn.

Duluth Union Depot & Transfer Co.—F. W. Wilsey has been elected Treasurer, vice G. C. Haven, Jr., resigned, and R. M. Bell has been elected Secretary, vice D. A. McKinley, resigned. R. M. Bell has been appointed Superintendent, vice F. Greene, resigned. The headquarters of the above officers will be in the union depot building, Duluth.

Grand Rapids & Indiana.—The annual meeting was held at Grand Rapids, Mich., March 2. Directors were elected as follows: W. O. Hughart, Harvey J. Hollister, W. R. Shelby, J. H. P. Hughart, James R. Barnett, Grand Rapids; Senator F. B. Stockbridge, Kalamazoo, Mich.; Thomas D. Messler, James McCrea, J. T. Brooks, Charles E. Speer, Benjamin Thaw, J. N. Hutchinson, Pittsburgh, and W. H. Barnes, Philadelphia.

Great Northern.—Myron Cooper has been appointed Master Mechanic of the Seattle & Montana, Fairhaven & Southern, and New Westminster Southern, with office at Fairhaven, Wash.

A. J. McCabe, Superintendent of the Dakota Division of the Northern Pacific, has been appointed Superintendent of the Montana division east of Spokane, Wash. Mr. McCabe is a brother of Joseph McCabe, Superintendent of the Pacific division of the Northern Pacific.

C. H. Jenks has been appointed Superintendent of the Montana Central, vice L. E. Johnson, transferred. Charles B. Kittredge has been appointed Chief Train Dispatcher of the Northern division.

Gulf, Colorado & Santa Fe.—C. Sinclair succeeds C. A. Lehman as General Roadmaster of the Southern Division, with headquarters at Temple, Tex.

Jupiter & Lake Worth.—A. W. Buie has been appointed Acting Superintendent, vice W. B. Coffin, previously Superintendent, with office at Titusville, Fla.

Lake Shore & Michigan Southern.—G. E. Husted, Freight Agent at Toledo, has succeeded T. F. Whittelsey as Division Superintendent, with headquarters at Toledo, O.

Mexican Central.—The following appointments have been announced: Adam Hoffman has been appointed General Freight Agent of the road; N. B. Wilkins, General Eastern Agent, with headquarters in New York City; S. O. Lewis, Superintendent of Transportation, and E. E. Styner, Superintendent of the City of Mexico Division.

Mexican International.—Charles Knapp has been appointed Secretary, with headquarters at 23 Broad street, New York City.

Monongahela River.—J. F. Partridge has been appointed Superintendent of Car Service, with office at Fairmount, W. Va.

Nevada Central.—A. B. Elliman, formerly Treasurer, with office in New York City, is now Treasurer and General Manager of this road with office at Austin, Nev. The office of General Superintendent has been abolished. J. C. Slater is Master Mechanic, with office at Battle Mountain, Nev., succeeding W. E. Killen.

New York Central & Hudson River.—A. T. Dice has been appointed Superintendent of Signals of this company, taking effect from March 1, 1893, with office at Grand Central Station, New York. He will have charge

of the construction, maintenance and operation of all signals, interlocking devices, etc., reporting to the General Superintendent.

Henry Gould, Assistant Superintendent, has been appointed Acting Superintendent of the Western Division to succeed George Burrows, who is on leave of absence for one year.

Norfolk & Western.—William C. Bullitt, Assistant to the President, has been appointed Vice-President in charge of the traffic department, to fill the vacancy caused by the resignation of Charles G. Eddy.

Owensboro, Falls of Rough & Green River.—The office of General Manager has been abolished. G. E. Coleman has been appointed Superintendent, with headquarters at Owensboro, Ky.

Pennsylvania.—W. Y. Coughlin has been appointed Assistant Engineer of the Baltimore Division of the Northern Central road, vice C. A. Preston, transferred to be Engineer of Maintenance of Way of the Philadelphia & Erie and Northern Central. Mr. Preston will have his headquarters at Williamsport, Pa., and succeeds L. H. Barker, promoted to be Principal Assistant Engineer of the New York Division.

George L. Potter, at present Master Mechanic of the Fort Wayne shops, succeeds F. C. Casanave as Superintendent of Motive Power of the northwest system, with headquarters at Fort Wayne, Ind. W. W. Atterbury, Assistant Engineer of Motive Power, succeeds to the position of Master Mechanic at the Fort Wayne shops and the Chicago shops.

Pennsylvania Co.—B. Fitzpatrick, Master Mechanic of the Cleveland & Pittsburgh, in charge of the shops at Wellsville and Cleveland, O., has been transferred to Columbus in charge of the Panhandle shops. T. E. Butler has been transferred from Crestline, O., to succeed him.

Philadelphia & Reading.—Benjamin F. Bertolet, Superintendent of the Atlantic City Division, has been transferred to the Shamokin Division to fill the vacancy caused by the transfer of Wellington Bertolet to the Reading Division. G. D. Whitcomb, formerly Superintendent of the Reading Division, has been transferred to the Atlantic City Division.

Portage Creek & Rich Valley.—The officers are as follows: President, G. D. Briggs, office 52 Exchange street, Buffalo, N. Y.; Treasurer, G. H. Smith, 52 Exchange street, Buffalo; Secretary and Superintendent, C. C. Briggs, Portage Creek, Pa., and Chief Engineer, George E. Mann, 52 Exchange street, Buffalo.

Terminal Railroad Association of St. Louis.—J. Q. Van Winkle having resigned to accept a position elsewhere, W. A. Garrett has been appointed as Acting Superintendent of Transportation, with office at St. Louis.

Texarkana & Fort Smith.—The officers of this company are now as follows: President, W. S. Taylor; Vice-Presidents, A. E. Stilwell and A. A. Mosher, all with offices at Kansas City, Mo.; Traffic Manager, F. B. Hubbell; General Agent, W. L. Whitaker; General Superintendent, W. A. Williams; Secretary and Treasurer, F. B. Hubbell, all with offices at Texarkana, Tex. General offices at Texarkana, Tex.

Texas Central.—Joseph McWilliams has been appointed Division Superintendent with headquarters in Waco, Tex. He was formerly Superintendent of the Northeastern Division, now known as the Texas Midland.

Texas & Gulf.—A meeting of the stockholders of this new railroad company was held in Marshall, Tex., Feb. 26, and the following officials elected: E. J. Fry, President; L. W. Lloyd, Vice-President; C. D. Lancaster, Secretary; W. C. Pierce, Treasurer, of Marshall, Tex.

Texas Midland.—E. H. R. Green, President, has made the following appointments: J. W. Culver, General Freight and Passenger Agent, with office at Terrell, Tex.; W. T. Flinn, Roadmaster, with office at Scurry, Tex.

Texas & Pacific.—T. C. Frew has been appointed General Eastern Agent of the Freight and Passenger Departments, with headquarters at 391 Broadway, New York, vice W. F. Kantz, resigned. Page Harris has been appointed General Live Stock Agent, with headquarters at Ft. Worth, Tex.

West Jersey.—The stockholders have elected these directors: George B. Roberts, Coleman F. Leaming, John M. Moore, Thomas H. Dudley, George Wood, N. Parker Shortridge, Henry D. Welsh, W. J. Sewell, Benjamin F. Lee, James H. Nixon, Josiah Wistar, David B. Gill, E. B. Comegys, William G. Nixon and Samuel Rea. The board has elected George B. Roberts, President; William J. Sewell, Vice-President; James R. McClure, Secretary, and Robert W. Smith, Treasurer.

Wheeling & Connelsville.—The annual meeting of the stockholders of this projected road was held in Wheeling, W. Va., last week, and the following directors were elected: W. A. Lynch, E. J. Hearne, R. H. Cochran, A. Reymann, W. F. Hubbard, Joseph Speidel, W. A. Isett, George Wise and C. A. Robinson.

RAILROAD CONSTRUCTION. Incorporations, Surveys, Etc.

Bellingham Bay & Eastern.—The company has at present two and two-tenths miles of track, reaching from the coal bunkers on Bellingham Bay through New Whatcom, Wash., and connecting with the Fairhaven & New Whatcom street railroad. Trains run over four miles of the street railroad track to a point near Lake Whatcom, where the company has three-tenths of a mile of track to its coal wharf on the lake. From this point a transfer barge carries 24 cars a distance of nine miles to the Blue Canyon Coal Mine, where the coal is loaded into the cars without removing them from the barge. On the Fairhaven & New Whatcom Railroad there is one 18-degree curve and one mile of $4\frac{1}{2}$ -per cent. grade. It is proposed to connect the company's lines by building four miles of road with 10-degree curves and $2\frac{1}{2}$ -per cent. grades, thus doing away with the trackage on the street road. The company has secured a franchise through New Whatcom and is now negotiating for right of way, and expects to complete the line during the summer. J. J. Donovan is Chief Engineer.

Canadian Pacific.—The construction forces for the proposed extension of the Souris branch in Manitoba to the International boundary line are now being organized and the grading will be resumed shortly. The material for the bridge over the Souris River, about 15

miles from Estevan, is being completed at Winnipeg. Estevan is the town to which the line was finished when the grading was suspended last winter.

The preliminary survey has already been made as far as the head of Arrow Lake on the proposed branch south from Revelstoke, B. C., on the main line, and a locating survey for about half this distance. This line is projected from Revelstoke down the Columbia River to connect with the Columbia & Kootenai branch connecting Lower Arrow Lakes with the Kootenai Lake. The contracts for the grading and track laying of the road have not yet been let, and Mr. Henry Abbott, of Vancouver, B. C., General Superintendent of the Pacific Division, under whose supervision the road will be built, has not yet decided when they will be let, but it is expected that the grading will be commenced in the spring.

Cape Shore.—This company, recently organized in Maine, has elected the following officers: President, George P. Wescott; Treasurer, George F. Gould, Portland, Me.; and Directors, S. R. Small, Charles F. Libby, Herbert G. Briggs, George F. Gould, George P. Wescott, of Portland.

Central Pennsylvania & Western.—This company has been organized by the consolidation of the Turbotville & Williamsport, the Orangeville & Lehigh and the Wilkes-Barre & Western. R. T. McCabe, of New York, is President, and E. R. Payne, of Williamsport, Pa., Vice-President. The first two lines are projected road, organized last fall as extensions of the Wilkes-Barre & Western.

Chicago, Joliet & Western.—Articles of incorporation were filed at Springfield, Ill., March 6, for this road, which will build from the Mississippi River to Chicago. The capital stock is \$5,000,000.

Chicago North Side Elevated.—This company was incorporated last week, Alexander Clark, Henry A. Craven, Robert H. Smith, Henry H. Banford and Paul Schwartzlose being named as incorporators. The route proposed for the new road is described as follows: Beginning at a point in Chicago, between the Chicago River and Twelfth street and the South branch of the Chicago River and Lake Michigan, and thence in a northerly direction to the northern limits of the city, with a branch leaving the main line between North avenue and Fullerton avenue, and extending westerly to a point near the North branch of the Chicago River; thence northerly to the city limits.

Clayton & Pea Ridge.—George Walcott, of Quincy, Ill., this week began the survey for this line from Clayton northwest to near Huntsville, Ill., about 11 miles. The grading will begin as soon as the weather will permit, and the contract has already been let. George Wever, of Clayton, is Secretary.

Indiana, Illinois & Iowa.—The stockholders last week voted to authorize the issue of \$500,000 of new bonds, the proceeds of which will be used to build a branch from Kankakee to South Bend, Ind.

Mexican Roads.—H. A. Smith, of Monterey, Mex., who recently built the Porvenir de Matehuala Railroad, has obtained a concession from the Federal Government for a road from Vanegas, on the line of the Mexican National, to Parras, on the Mexican International line. The projected road will traverse the rich mineral districts of Mazapil and Concepcion del Oro, with a branch to San Carlos, on the line of the Mexican International.

Mobile & Birmingham.—It is contemplated at an early date to extend the track of this road into the city of Mobile, Ala., from Mobile and Birmingham Junction, the present southern terminus of the road, a distance of about two and one-half miles. The contract for the work has not yet been awarded, but bids for same are now in hands of the Chief Engineer.

New Roads.—Two miles of the track for the new railroad up Shade Creek, from near Meyersdale, Pa., for the Johnstown Lumber Co., has been laid within the past three weeks, and the work is now about half completed. It is expected to have the road all down by April 1.

At a meeting of interested parties in opening a railroad from the Franklin & Megantic Railroad to Dead River Valley, Maine, held last week at Kingfield, Me., articles of incorporation were signed and a board of directors chosen, consisting of E. G. Smith, of Boston; F. D. Barryman, of Linnfield Center, Mass.; John Winter, A. G. Winter, G. M. Vose, of Kingfield; T. D. Parsons, of Lower Dead River, and Allen Blanchard, Jr., of Stratton. It is intended to construct at least ten miles of the road next spring, to open up large timber tracts in Jerusalem and vicinity.

Eugene Zimmerman, of Cincinnati, Vice-President of the Cincinnati, Hamilton & Dayton, and Hamilton Brown, of Ft. Dodge, Iowa, are reported to have recently purchased about 3,500 acres of mining land in Boone County, Iowa, on the Des Moines River, about 50 miles northwest of Des Moines, Iowa. It is proposed to build a railroad about 12 miles from the Chicago & Northwestern near Dayton to reach the property.

The construction material is being delivered at Fort Steele Station on the Union Pacific for a proposed railroad through central Wyoming, to reach the soda and coal and iron mines, which it is reported have been purchased by a syndicate headed by ex-Governor Campbell, of Ohio. Coe & Carter are understood to have the contract for building a railroad to reach these mines, and they are now establishing camps and have about 150 men employed in getting timber for the new line.

Thomas O'Neil, A. C. Hall and H. Patten, of Booneville, N. Y., members of the Forestport Lumber Co., are, it is reported, about to build a road from the Adirondack & St. Lawrence road, near the Forestport station, and thence into the timber land for 25 miles to the lumber camps near North Lake. It is also proposed to extend the branch from North Lake to the Canachagala Lake and Moose River.

North Carolina Roads.—Bills to incorporate the Reidsville, Yanceyville & Atlantic and New South Air Line roads are before the state legislature.

Northeastern California.—This road is being built from a point in Shasta County, Cal., on the Oregon & California road, north to Klamath Falls, Or., a point about 12 miles north of the California state line. D. E. Miles, President of the Red Cross Lumber Co., formerly of Chippewa Falls, Wis., is President of the new road. The surveys have been made for about 30 miles and the balance of the line will be surveyed at once. The road is through fine agricultural lands, and extensive tracts of yellow and white pine timber will also be reached.

North Pacific Coast.—It is said that as soon as the surveys now in progress to Bolinas Ridge are completed and the route chosen, the company will build a road from a point on Richardson's Bay, just above Sausalito, Cal., to Bolinas, a distance of 21 miles, skirting the ocean shore.

Ohio River & St. Louis.—Articles of incorporation were filed at Springfield, Ill., this week by this company, which proposes to build a road from the Ohio River through the counties of Pope and Johnson, Ill., to connect with the Cairo Short Line near Reevesville, Ill. The capital stock is \$150,000.

Pecos Valley.—The Pecos Valley Irrigation & Improvement Company, of New Mexico, have, according to reports in local papers, placed a large issue of bonds in New York and London for the extension of the railroad northward from Eddy, N. M. The route will be from Eddy to the new town of Hagerman on the Rio Feliz, in Chaves County, a distance of 60 miles, thence to a connection with the Atchison, Topeka & Santa Fe main line not far from the Rio Pecos. It is the intention of the company to have the line completed to Bernal within 18 months.

Portage Creek & Rich Valley.—The charter of this company was recently filed in Pennsylvania, but the road has been in operation for nine miles about a year. It commences at Portage Creek, McKean County, Pa., connecting with the Western New York & Pennsylvania road at that point and extends southwesterly nine miles into the bituminous coal lands of G. D. Briggs. The road will be extended three miles the coming spring through the timber and coal lands of G. D. Briggs. The contracts for the extension have not yet been let. The road is constructed with 65-lb. steel rails and the equipment consists of two Shay engines, manufactured at Lima, O., weighing about 40 tons each, and also 18 freight cars. The passenger equipment is yet very incomplete. G. D. Briggs, of Buffalo, N. Y., is President.

Royersford & Spring City.—A charter for a road of the above name was filed at Harrisburg, Pa., last week, the capital being \$12,000.

Sherman, Shreveport & Southern.—The Secretary of State of Texas last week granted a charter to this company, which has acquired the property of the East Line & Red River. Its capital stock is \$3,000,000, and the incorporators are H. W. Poor, E. F. Hyde, of New York, and J. J. Frey, W. M. Giles, T. Randolph, W. B. Munson, T. H. King, W. A. Weltman, E. M. Alvord and W. T. Atkins, of Texas. The line will be extended easterly from Jefferson to a point on the state line in the direction of Shreveport, a distance of 35 miles; westerly from McKinney to Decatur, a distance of 50 miles, and also northwesterly from McKinney to Whitsboro, in Grayson county, a distance of 35 miles.

Sun Dance, Spearfish & Eastern.—Engineers reported to be in the service of this company, a newly organized railroad, are making surveys from Spearfish, Wyo., and from a connection with the Chicago, Burlington & Quincy to Sun Dance, in the northeastern part of Wyoming.

Texas & Gulf.—The charter for this company to build the line described last week from Marshall, Tex., south through the eastern counties of the state to Sabine Pass was filed at Austin on March 2. The incorporators are E. J. Frye, W. M. Robertson and others, of Marshall, Tex.

Velasco Terminal.—The three-mile Surf Side branch from Velasco, Tex., will be constructed without further delay, and the material is expected to be delivered in a few weeks. Nary & Sons have the contract for the grading.

Wilmington, Onslow & East Carolina.—Work is now rapidly progressing on the extension from Jacksonville, Onslow County, to Newbern, Craven County, N.C. H. A. Whiting, General Manager, expects to have the extension completed by May. The grading is now completed to within three miles of Newbern, and the track has already been laid to Starkey's, Onslow County, 11 miles beyond Jacksonville. The extension will be 38 miles long and when it is completed the mileage between Wilmington and Newbern will be 88 miles. From Jacksonville to Newbern the road runs through portions of Onslow, Jones and Craven counties, and it will develop a rich truck farming region.

Winston, Salem & Charleston.—It is said that this is the title of the new road which the Atlantic Coast Line proposes to build as a connecting link between the coal fields of Virginia and the cities of the South Atlantic coast. A bill to incorporate the road was introduced in the last North Carolina Legislature. The proposed route of the road was through the counties of Davidson, Randolph, Montgomery, Stanley and Anson, by way of Wadesboro.

Worcester & Shrewsbury.—An extension of this road from Worcester east to Marlboro, Mass., has been long projected, and the work may be completed this year. The local newspapers state that H. H. Bigelow and Hon. Stephen Salisbury, of Worcester, have decided to build the line, and that they have authority to extend the line across Lake Quinsigamond when they widen the causeway 10 ft.

GENERAL RAILROAD NEWS.

Atchison, Topeka & Santa Fe.—The comparative statement of operations for the month of January and the seven months of the fiscal year are shown in the following tables:

Month of January:	1893.	1892.	Inc. or dec.
Aver. operated mileage	7,130	7,125	I.
Gross railroad earn.	\$2,892,108	\$2,620,595	I. \$271,513
Oper. expenses	2,263,126	2,105,855	I. 157,271
Net earn.	\$628,982	\$514,740	I. \$114,242
Other receipts	75,000	75,000	
Total net earn.	\$703,982	\$589,740	I. \$114,242
One-twelfth ann. fixed charges	850,000	850,000	
Deficit	\$146,018	\$260,260	D. \$114,242
Seven months to Jan. 31:			
Aver. operated mileage	7,130	7,122	I.
Gross railroad earn.	\$23,583,385	\$22,110,421	I. \$1,472,964
Oper. expenses	15,932,011	15,077,900	I. 854,111
Net earn.	\$7,651,374	\$7,032,521	I. \$618,853
Other receipts	525,000	525,000	
Total net earn.	\$8,176,374	\$7,557,521	I. \$618,853
Seven-twelfths ann. fixed charges (est.)	5,950,000	5,950,000	
Surplus	\$2,226,374	\$1,607,521	I. \$618,853

AGGREGATED GENERAL SYSTEM.

Month of January:	1893.	1892.	Inc. or dec.
Aver. operated mileage	97,345	9,340	I.
Gross railroad earn.	\$3,727,198	\$3,379,472	I. 347,726
Oper. expenses	2,916,290	2,677,784	I. 238,506
Net earn.	\$810,908	\$701,688	I. \$109,220
Other receipts (est.)	75,000	75,000	
Total net earn.	\$885,908	\$776,686	I. \$109,220
One-twelfth ann. fixed charges (est.)	1,194,000	1,192,000	I. 2,000
Deficit	\$308,092	\$415,312	D. \$107,220
Seven months to Jan. 31:			
Aver. operated mileage	9,344	9,336	I.
Gross railroad earn.	\$30,616,327	\$28,794,468	I. \$1,821,859
Oper. expenses	20,570,994	19,263,668	I. 1,307,326
Net earn.	\$10,045,333	\$9,530,800	I. \$514,533
Other receipts	525,000	525,000	
Total net earn.	\$10,570,333	\$10,055,800	I. \$514,533
Seven-twelfths ann. fixed charges (est.)	8,358,000	8,344,000	I. 14,000
Surplus	\$2,212,333	\$1,711,800	I. \$500,533

Carolina, Knoxville & Western.—An order was filed in the United States Court at Charleston, S. C., March 2, indefinitely postponing the sale of the above railroad. The sale was ordered to take place on March 8, 1893, under a suit for foreclosure brought by the National Bank of Augusta. The decree of foreclosure remains in force and the date of the sale is to be fixed in a future order.

Central of Georgia.—John H. Inman, James Swann, Bernard S. Clark and Robert W. Inman, against whom a suit was brought in the United States Circuit Court by the Richmond Terminal Company, in connection with the alleged fraudulent purchase of the Central of Georgia Railroad, filed their answer this week, denying all the allegations. The defendants deny all knowledge of the details of the purchase of \$20,000,000 of the Georgia Central stock, and say that whatever action was taken by the directors at the time of the purchase was subsequently ratified in every particular by the stockholders. The pending suit, it is claimed, has been brought by stockholders who have either become members of the company since the transaction and were fully aware of the facts bearing upon it, or were stockholders previous to the transaction, and by their votes ratified the action of the directors in the purchase of the stock.

Chattanooga, Rome & Columbus.—W. C. Bunn has been appointed permanent receiver under the petition of a number of stockholders in the North. The road is an operated line of the Central of Georgia, and when that company was placed in the hands of a receiver the authority of its receiver was extended over the above road.

Chicago, Burlington & Quincy.—The statement of earnings for January is as follows:

	1893.	1892.	Inc. or dec.
Gross earnings	\$3,052,292	\$3,008,793	I. \$43,494
Operating expenses	2,205,339	2,069,210	I. 136,129
Net earnings	\$846,953	\$939,588	D. \$92,635
Fixed charges	830,000	815,075	I. 14,925
Surplus	\$16,953	\$124,513	D. \$107,560

In estimating annual charges, income from treasury assets is deducted.

Chicago, Milwaukee & St. Paul.—The earnings for January, while showing an increase of six per cent. in gross, show a decrease in net earnings, and the statement for the seven months is still more unfavorable. Following is the statement:

	1893.	1892.	Inc. or dec.
Gross earnings.....	\$2,555,182	\$2,420,917	I. \$134,264
Operating expenses....	1,884,472	1,741,395	I. 143,077
Net earnings.	\$670,709	\$679,522	D. \$8,813
<i>Seven months to Jan. 31, 1893:</i>			
Gross earnings.....	\$21,174,322	\$19,973,952	I. \$1,200,370
Oper. exp. inc'g taxes...	13,649,906	12,235,530	I. 1,414,376
Net earnings.....	\$7,524,416	\$7,738,422	D. \$214,006

Chicago & South Side Rapid Transit.—The first mortgage of this road, which amounts to \$5,000,000, was filed in Illinois last week, and is in favor of the Northern Trust Company. It is to secure the five per cent. 40-year bonds, issued to construct and equip the first and second sections of the elevated railroad.

East & West of Alabama.—The foreclosure sale of this road will take place in Birmingham, Ala., on April 10 under the order of Judge Pardee of the United States Court. The road was placed in the hands of a receiver, Charles P. Ball, over two years ago. It extends from Cartersville, Ga., to Pell City, Ala., a distance of 116 miles.

Lehigh Valley.—The result of the operation of the lessee for the month of December, 1892, is as follows:

	1892.	1891.	Inc. or dec.
Gross earn.....	\$1,760,555	\$1,610,235	I. \$150,320
Oper. expenses.....	1,171,082	1,209,303	D. 38,221
Net earn.....	\$589,473	400,932	I. \$188,541

Louisville, Evansville & St. Louis.—At a meeting of stockholders of the company, at Belleville, Ill., March 1, it was voted to issue \$15,000,000 of new bonds; \$8,000,000 to be used to retire outstanding bonds and \$2,000,000 to retire preferred stock. The balance to be used for betterments to the roadbed and for new equipment. A seven per cent. dividend was declared on the common stock.

Macon & Northern.—Interest on the first mortgage bonds, amounting to \$49,500, due March 1, was defaulted. The interest was payable in New York, and it was expected that the Central of Georgia would pay the interest. About two years ago the Macon & Northern, which was then known as the Covington & Macon, was offered for sale, and the road was leased by the Richmond & Danville and the Central of Georgia, the interest on the bonds being guaranteed. The two roads operated it jointly for a time, but when the semi-annual interest fell due six months ago the Richmond & Danville refused to pay its part of the interest and the Central of Georgia paid the entire amount and has been operating the road alone under the management of Receiver Comer. Now the company refuses to pay the interest due.

Mount McGregor.—The property of this company, including the railroad from Saratoga Springs to Mount McGregor, 11 miles, and the Hotel Balmoral, was sold at Ballston, N. Y., March 6, to satisfy foreclosure on a

second mortgage bond held by George West. The property was bought by Douglass W. Mabey on behalf of the first mortgage bondholders at the amount of judgment.

New York & Massachusetts.—Russell Sage, of New York City, was the purchaser of this road at the foreclosure sale at Poughkeepsie, N. Y., last week. Mr. Sage recently purchased a majority of the first mortgage bonds, the amount issued being about \$29,000. The road is 40 miles long from Poughkeepsie, N. Y., where it has good terminals northwest to Boston Corners, N. Y. Extensive improvements of the property will be begun shortly, and it is also stated that the line will be extended, but the latter report is not confirmed.

New York & New England.—President Parsons issued this week the report of the operations of the company for the year ending Dec. 31. In it he makes statements, supported by statistics, which reflect seriously upon the preceding managements. He complains of the treatment the company has received at the hands of the New York, New Haven & Hartford and the Pennsylvania Railroad companies. The final result for the year is a net deficit of \$60,431. Had any dividend been paid upon the preferred stock last year the deficit would have been much larger. The financial statement gives these results for the year: Earnings, \$6,220,495; operating expenses, \$4,412,147; net earnings, \$1,808,348; fixed charges, \$1,874,133; deficit, \$65,785; income from operation of Boston Harbor transfer, \$5,334; net deficit, \$60,431. The total net increase in fixed charges in the year was \$33,072. For the first three months of 1892 the net earnings decreased \$196,812; for the last nine months there was an increase of \$99,477. During last year 75,000 ties were paid for which had been contracted for in the previous year and which were not required. One of the most important savings Mr. Parsons was able to make was \$91,552 in the price of coal used by the road. "During the year 1891," according to the report, "the car accounts of the company were deliberately falsified in a manner which your management believes, with perhaps one exception, is unique in the operations of railroads. Month by month the amounts due other companies for the use of their cars were systematically reduced. The amount thus stolen from other railroad companies was \$80,812. This treatment of other companies was not discovered until some time after the present management had assumed charge of the road. Since then arrangements have been made to pay the amounts due." At least \$32,000 of the loss in through passenger earnings reported was upon business interchanged with the New York, New Haven & Hartford Railroad. The loss on through freight was much greater.

New York, New Haven & Hartford.—The Connecticut Legislature last week passed the resolution authorizing the increase of the capital stock of this railroad to \$100,000,000, various restrictive amendments to the measure as introduced being voted down by large majorities. A resolution is now before the Senate of the Connecticut Legislature authorizing the company to change its corporate name. A special meeting has been called for April 14 to accept the amendments to the charter authorizing the increase of the capital stock and to vote on the leases of three of the northern branches of the Housatonic road.

New York & Northern.—President Depew, of the New York Central & Hudson River road, said this week that conferences had taken place looking to the transfer of the above road to the New York Central, but no agreement had yet been made. This road is 54 miles long, extending from the northern terminus of the west side elevated roads to Brewster's, N. Y., on the New York & New England, passing through an attractive suburban region.

Notice is given to the second mortgage bondholders that the bondholders' agreement of April 23, 1892, not having been signed by holders of \$2,000,000 necessary to make it operative, has been terminated.

Oregon & Pacific.—T. Edgerton Hogg was removed as Receiver by Judge Fullerton, of Oregon, last week, and E. W. Hadley, of Corvallis, Or., has been appointed in his place. The sale of the railroad, which was to have occurred on March 7, has been postponed. The statement in the press dispatches as to the period of extension are conflicting. One report is that the petition of the bondholders for a further extension of three months to permit of time to make a complete examination of the railroad's accounts was granted, and another dispatch says that only a week's extension was allowed.

Philadelphia & Reading.—It is pretty generally believed that some change in the Lehigh Valley lease, in regard to the rental to be paid by the Philadelphia & Reading, will soon be made, and it is stated positively that the amount of the rental will be reduced from seven to five per cent., and that a formal proposition to that effect has been made after conferences between the Receivers of the Reading road and the Executive Committee of the Lehigh Valley.

The new terminal station at Philadelphia will be opened on March 12 next, when all the New York express trains, and also the express trains of the Reading Division now arriving at and departing from Ninth and Green streets, will be run in and out of the new Market Street Terminal Station, which is reached by the elevated road recently constructed. After March 26 all trains of the entire system now entering in Philadelphia will run into the new station. Passenger trains on one of the suburban divisions have been into the new station for some weeks. The head house is not yet finished, and temporary waiting rooms and ticket offices will be used.

St. Louis, Cape Girardeau & Fort Smith.—The appointment by Hon. A. Ross, Judge of the Common Pleas Court, of Louis Houck, President of the road, as Receiver, on the application of the company, was announced at Cape Girardeau, Mo., this week.

San Francisco & North Pacific.—A. W. Foster and Sidney V. Smith, who purchased the 42,000 shares of stock of this railroad controlled by the estate of the late J. M. Donohue do not represent the firm of Seligman & Co., the New York bankers, as was reported in the dispatches printed last week. Seligman & Co. did not bid higher than \$10 a share, and the sale to Foster & Smith was made at \$20.25 a share or a total of \$850,000, and this sale has since been confirmed by the court. The purchasers state that they are not acting for any syndicate or corporation.

Texarkana & Fort Smith.—The suit of J. H. Bemis, who alleges that he owns one-half the stock of the company and who recently filed a petition asking that the road be placed in the hands of a receiver, is now being heard at Texarkana, Tex. He also asks that a permanent

injunction be issued to prevent the transfer of the railroad to the Missouri, Kansas & Texas Trust Company, which controls the Kansas City, Nevada & Fort Smith Railroad, in Missouri.

Union Belt Line (Memphis).—A report that the control of this belt line at Memphis, Tenn., had been secured by the Louisville & Nashville, followed upon a visit of President M. H. Smith to that city for a few days. It is said that the purchase was made to give that road a direct connection with the new Memphis bridge. The belt line is built for 2½ miles, and the construction of 3½ miles additional would give the Louisville & Nashville connection with all the roads entering Memphis.

Western New York & Pennsylvania.—The directors last week voted not to pay the interest due April 1 next on the second mortgage bonds, since the net earnings of the company, after providing for the maintenance of the property, are not sufficient to pay the interest then due. A statement was authorized by the board that the company's business shows a large increase for the last five years, since its reorganization in 1887, but the low rates for transportation have offset to a great extent that advantage. It has been decided that the payment of the interest upon the second mortgage bonds is at present beyond the company's power, and that the welfare of the company renders it imperative that the interest upon said bonds must be made dependent upon the net earnings, after providing for the annual requirements for the necessary improvements of the property.

Wilkes-Barre & Western.—The company has issued notice of a meeting of the stockholders at Watertown, Pa., on March 15, to consider an agreement of merger between the company and the Orangeville & Lehigh Valley and Turbottville & Williamsport railroads. The last two lines were chartered in Pennsylvania last year by directors and stockholders of the Wilkes-Barre & Western.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, March 8, 1893.

The regular meeting of the Western Passenger Association convened yesterday. A number of routine matters were considered. The report of the special committee on revision was presented and passed, to be considered at a special meeting to be called later. This action was taken by mutual agreement, because the representative of one of the interested lines was absent on account of sickness.

Chairman Midgley was unsuccessful in his efforts to obtain a modification or extension of time of the order of the Interstate Commerce Commission in regard to differentials on grain to Minneapolis and Duluth, and the rate clerks are now engaged in checking out the rates on the new basis.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines for the week ending March 4, amounted to 81,942 tons, against 75,315 tons during the preceding week, an increase of 6,627 tons, and against 100,502 tons during the corresponding week of 1892. The proportions carried by each road were:

Roads.	W'k to Mar. 4.		W'k to Feb. 25.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central.....	10,382	12.7	11,792	15.7
Wabash.....	7,183	8.8	7,093	9.3
Lake Shore & Michigan South.	16,963	20.7	13,395	17.8
Pitts., Ft. Wayne & Chicago.	10,643	13.0	9,949	13.2
Pitts., Cin., Chicago & St. Louis	7,411	9.1	4,694	6.2
Baltimore & Ohio.....	4,479	5.5	5,566	7.4
Chicago & Grand Trunk.....	8,621	9.8	7,587	10.1
New York, Chic. & St. Louis.....	6,233	7.6	4,985	6.6
Chicago & Erie.....	8,179	9.9	8,801	11.7
C., C., C. & St. Louis.....	2,418	3.0	1,538	2.0
Totals.....	81,942	100.0	75,315	100.0

Of the above shipments 12,669 tons were flour, 41,662 tons grain and millstuff, 6,556 tons cured meats, 11,998 tons dressed beef, 1,808 tons hides, and 4,439 tons lumber. The three Vanderbilt lines carried 41 per cent., and the two Pennsylvania lines 22 per cent.

Traffic Notes.

The merchants of Spokane have formed a "Shippers' Association" to look after freight matters in which they are interested. The chief active officer is Mr. A. B. Jackson, late of the Northern Pacific road.

The train between Boston and Portland, over the Eastern Division of the Boston & Maine, running through in three hours, which was recently put on, is said to be very successful, and it is announced that a similar train will be run on the Western Division between the same cities.

The officers of the California Traffic Association announce that they have closed a contract with the Panama railroad for through traffic with New York and Europe by way of that road. It appears, however, that the association has not yet raised all the capital necessary to establish the steamship line between San Francisco and Panama.

The railroads centring in Atlanta, Ga., a few months ago agreed to discontinue the free delivery of freight, which had come to be an established custom there, and the agreement has been generally well kept; but it is now reported that the Western & Atlantic has kicked out of the traces and that a number of lines will resume free delivery.

The "Southern Freight Committee" has been organized at St. Louis by the roads in the Mississippi Valley below St. Louis and east of the river. Most of these roads belong to the Southern Railway & Steamship Association, and it is said that the new committee will serve as an auxiliary to that association. Seth Fink is Chairman, with office at St. Louis.

The roads running eastward and northward from Memphis recently agreed upon a rule to freeze out the agents of the fast freight lines in that city, who, it appears, give bills of lading about the same as though they were direct representatives of the initial roads. A big fuss was made, however, and the Louisville & Nashville withdrew from the agreement, which probably will break it up.

A circular has been issued by the Joint Committee stating that it was agreed by the Presidents at New York, Feb. 24, that taking effect March 7 they will not reduce properly authorized passenger fares by any form of concession, or pay any share or allow, for their several lines east of Chicago and St. Louis, the whole or any

part of any form of commission in connection with the sale of east-bound tickets, wherever issued, reading through either Chicago or St. Louis to the western terminal of the Trunk Lines and all points east of said termini.

There is apparently considerable question whether the award of the arbitrators in regard to passenger rates in Chicago and Ohio River territory will result in keeping the lines from another war. The roads all agreed to leave the matter entirely to the arbitrators, but when they received their award the Big Four dissented, claiming that it had distinctly stated that it would never agree to a division of the business. The officers of that road say they will put the advanced rates in force and maintain them as long as the other lines do, but they want the agreement resubmitted and arbitrated again.

Annual Report.

Pennsylvania Railroad Company.—The annual report of this company for 1892 is just issued. An abstract follows:

Main Line and Branches, Philadelphia to Pittsburgh.

Earnings.....	\$42,359,540.17
Expenses.....	28,568,712.99
Net earnings.....	\$13,800,827.18
Interest from investments, use of equipment and other items.....	5,525,200.97
Total.....	\$19,326,028.15
Rentals, interest on bonded debt, state tax on dividends.....	8,531,776.71
Net income Pennsylvania Railroad Division.....	\$10,794,251.44

Philadelphia to New York and Branches.

Earnings.....	\$19,001,657.78
Expenses.....	15,135,919.28
Net earnings.....	\$3,865,738.50
Interest from investments and rents.....	517,781.56
Total.....	\$4,383,520.06
Payments on account of dividends, interest, rentals, etc.....	4,682,688.14
Net loss under lease.....	299,168.08
Balance.....	\$10,495,081.76

Philadelphia and Erie Railroad and Branches.

Earnings.....	\$7,480,616.81
Expenses.....	5,124,698.43
Net earnings.....	\$2,355,918.38
Payments on account of rentals.....	2,345,053.35
Profit.....	10,849.03
Balance.....	\$10,505,910.79

From this balance of income for the year the following amounts have been deducted, viz.:

Fund for the purchase of securities guaranteed.....	\$89,179.93
Consolidated mortgage bonds, sinking fund account.....	324,780.00
Straightening and revising lines and grades, and for other purposes not properly chargeable to capital account.....	1,263,136.98
Balance.....	\$8,828,513.88
Out of which was paid a dividend of six per cent.....	7,606,456.50

Transferred to credit of profit and loss for the year 1892.....	\$1,222,357.38
Received in settlement of sundry accounts and profits on securities sold and the dividend received on stock of Pennsylvania Company.....	904,669.04
To credit of profit and loss Dec. 31, 1891.....	\$2,127,026.42
To credit of profit and loss Dec. 31, 1892.....	\$26,461,800.75

While there was a material increase in the gross revenues of the company, there was a greater increase in the expenses; and the net revenue was further diminished by the fact that the tax levied upon capital stock by the Commonwealth of Pennsylvania was almost doubled in the past year. Notwithstanding this reduction in the net revenues the company was able to continue the improvement of its lines, and, after paying a dividend of six per cent., carry to the credit of profit and loss account the sum of \$2,127,026.42. The statements contained in the report show that, while the percentage of operating expenses was increased, it was due, not to the cost of moving the traffic, but to the fact that the rates prevailing during the year 1892 were, owing to the severe competition among the transportation lines of the country, materially lower than those in force in 1891. With proper compensation for the movement of the traffic the volume offered would have made the year 1892 one of great prosperity to the entire railroad system.

There were used in construction and repairs on the main line 33,817 tons of steel rails and 1,168,422 ties; on the United Railroads of New Jersey Division, 7,705 tons of steel and 302,926 ties; on the Philadelphia & Erie Railroad Division, 5,048 tons of steel and 204,019 ties; making a total of 47,170 tons of steel and 1,735,367 ties. There were built at Altoona and other shops east of Pittsburgh and Erie 220 locomotives, 134 passenger cars, 58 baggage, express and mail cars, 3,569 freight cars and 293 cabin and maintenance-of-way cars.

The percentage of operating expenses to earnings on all lines east of Pittsburgh and Erie was 70.92 for 1892 and 68.14 for 1891, showing an increase for the year 1892 of 2.78 per cent.

The aggregate coal and coke shipments over the Pennsylvania Railroad Division amounted to 23,767,921 tons, as against 21,991,366 tons in 1891, an increase of 1,836,555 tons, or 8.37 per cent. The coal shipments increased 969,665 tons, or 5.64 per cent., and the coke shipments increased 866,890 tons, or 18.29 per cent. The coal and coke tonnage of the Pennsylvania Railroad Division was 56.76 per cent. of its total tonnage. The total shipments of oil over the Pennsylvania Railroad Division during the year 1892 amounted to 2,082,432 barrels, against 3,182,901 barrels in 1891, showing a decrease of 1,100,469 barrels.

The result of the operations of the four coal companies shows an increase in gross earnings of \$819,804.57, a decrease in expenses of \$232,929.61, and an increase in net earnings of \$1,052,734.18. Total tons mined in 1892, 2,572,416.15. Decrease, compared with previous year, 25,513.05 tons. The average receipts per ton at point of sale, aggregating the results of the four coal companies for 1892, were \$3.17, as against \$3.02 in 1891.

Lines West of Pittsburgh.

The following statement gives the result of the lines west of Pittsburgh operated by the Pennsylvania Com-

pany and the Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company:

Pennsylvania Company.

Earnings on lines operated directly.....	\$22,506,656.08
Expenses.....	14,454,302.55
Net earnings.....	\$8,052,353.53
Rental, interest and liabilities.....	6,822,379.69
Net profit.....	\$1,229,973.84

Pittsburgh, Cincinnati, Chicago & St. Louis Railway Company.

Earnings.....	\$18,923,944.44
Expenses.....	14,205,415.95
Net earnings.....	\$4,718,528.49
Rental, interest and liabilities.....	3,576,971.79
Net profit.....	\$1,141,556.70

Net profit on lines west of Pittsburgh for 1892.....	\$2,372,495.54
Net profit on lines west of Pittsburgh for 1891.....	2,616,621.24

Comparative decrease on lines west of Pittsburgh for 1892.....	\$244,125.70
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Other Lines West of Pittsburgh.

Earnings.....	\$5,938,983.01
Expenses.....	4,240,820.78
Net earnings.....	\$1,698,162.23
Rental, interest, etc.....	1,669,472.20
Profit.....	\$28,690.03
Profit to the company.....	20,492.89
Added to profit above.....	2,372,495.54

Profit on all lines west of Pittsburgh for 1892.....	\$2,392,988.43
Profit on lines west of Pittsburgh for 1891.....	2,662,970.32

Showing a comparative decrease for 1892, compared with 1891, of.....	\$269,981.79
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The amount expended during the year on capital account on the lines west of Pittsburgh was \$5,435,440.15.

The capital expenditures upon these lines, as indicated in the last report, have been very large during the past year. Nearly 400 miles of track were put under construction, of which about 230 miles had been laid at the close of the year, and work upon the remainder is being vigorously prosecuted. Extensive additions were also made to the equipment, including 50 engines and 100 passenger coaches. That portion of the Toledo, Wal-

honding Valley & Ohio Railroad, 45½ miles in length, lying between Coshocton, on the Pittsburgh, Cincinnati, Chicago & St. Louis Railway, and Loudonville, on the Pittsburgh, Fort Wayne & Chicago Railway, has practically been completed, and will shortly be opened for traffic. This line not only forms a connection between your Southwestern and Northwestern systems, but also affords one of the most direct routes between the coal fields of southern Ohio and the lake ports. It is believed that it will prove a satisfactory investment and tend largely to increase the revenues of the former Northwestern Ohio road, a constituent portion of its line. There were used in construction and repairs on the Northwestern lines operated directly 22,207 tons of new steel rails, and on the Southwestern lines 16,500 tons, making an aggregate of 38,707 tons.

In order to increase the capital stock of the Pennsylvania Company to meet its financial requirements, your company subscribed during the year to \$1,000,000 thereof, and paid for the same at par in cash, making the total amount now outstanding \$21,000,000.

SUMMARY OF ALL LINES.

	1892.		Total.
	East of Pittsburgh and Erie.	West of Pittsburgh and Erie.	
Gross earnings.....	\$91,704,076.70	\$17,210,439.95	\$108,914,516.65
Expenses.....	65,552,243.42	32,798,839.87	98,351,083.29
Net earnings.....	\$26,211,833.28	\$14,410,604.08	\$40,622,437.36

	1891.		Total.
	East of Pittsburgh and Erie.	West of Pittsburgh and Erie.	
Gross earnings.....	\$90,044,328.75	\$41,210,283.76	\$131,254,612.51
Expenses.....	62,250,282.02	29,569,778.13	91,819,060.15
Net earnings.....	\$27,794,046.73	\$11,640,505.63	\$39,434,552.36

Freight Traffic.

	1892.		Total.
	Tons.	Tons one mile.	
East of Pittsburgh and Erie.....	98,448,863	9,173,683,680	
West of Pittsburgh.....	42,922,983	4,283,353,686	
Totals.....	141,371,846	13,457,037,366	

	1891.		Total.
	Tons.	Tons one mile.	
East of Pittsburgh and Erie.....	92,436,515	8,553,382,906	
West of Pittsburgh.....	37,556,084	3,732,331,801	
Totals.....	129,992,599	12,285,714,707	

Passenger Traffic.

	1892.		Total.
	Passengers.	Pass. one mile.	
East of Pittsburgh and Erie.....	70,838,823	1,290,788,931	
West of Pittsburgh.....	18,851,518	478,118,391	
Totals.....	89,690,341	1,768,907,322	

	1891.		Total.
	Passengers.	Pass. one mile.	
East of Pittsburgh and Erie.....	68,684,033	1,201,891,812	
West of Pittsburgh.....	18,250,484	441,021,585	
Totals.....	86,934,517	1,642,913,397	

The amount expended during the year upon the Main Line and branches between New York and Pittsburgh, and charged to capital account, was \$5,729,576. These expenditures were almost exclusively for additional tracks, yard facilities, and equipment necessary to provide for the more prompt and economical handling of the increasing volume of business, and for the purchase of real estate, which it was advisable to acquire at termini to provide for the present and future wants of the company.

In addition to the 200 freight cars brought into the equipment account through the system of car trusts, there have been added during the year 82 locomotives, 57 passenger coaches, 57 combination baggage and mail cars, 1 postal car, 2 dining cars and 1,000 freight cars. All the new cars have been provided with automatic coupler and air brake.

There was also expended in the construction of branch and auxiliary lines the sum of \$4,239,603.94, of which \$1,221,790.79 was reimbursed to the company in cash. There was expended on account of construction and equipment on the Western lines the sum of \$7,001,940.69, the larger portion of which was in the construction of double track and additional sidings; it will be necessary to pursue this policy vigorously during the present year.